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A

MANUAL OF NURSING

MEDICAL AND SURGICAL

BY

CHARLES J. CULLINGWORTH, M.D.

F.R.C.P. LOND.

OBSTETRIC PHYSICIAN TO ST. THOMAS'S HOSPITAL

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A SHORT MANUAL FOR MONTHLY NURSES

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PREFACE.

A Third Edition of this little book being called for, I have taken the opportunity of again thoroughly revising it.

I have to express my grateful thanks to Mr. W. H. Battle, late Resident Assistant Surgeon at St. Thomas's Hospital, and now Assistant Surgeon at the Royal Free Hospital, who has kindly made himself responsible for the Surgical Part of this Edition (Chaps. VII. to XII.); and also to my friend, Dr. Thomas Barlow, for many valuable suggestions in the chapter on Fever Nursing and Disinfection.

I have, too, the pleasure of once more expressing my obligations to those who have so generously given me permission to use their woodcuts.

C. J. C.

46 Brook Street,
Grosvenor Square, W.
November 1889.

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CHAPTER I.

The Sick-room: Selection—Ventilation—Temperature—Bed and Bedding—Bed-frames—Pillows and Bed-rests—Roller-pillows—Bed-hangings—Water-beds—Furniture—Carpets—Position of Visitor's Chair—Cleaning.

SELECTION.—A sick-room, whenever practicable, should fulfil the following conditions:—It should, first of all, be large and lofty; it should possess a fireplace, not only for the sake of warmth and comfort, but to ensure proper ventilation; it should be light and sunny, and therefore should not have a northern aspect; it should be a quiet room, and hence should not be over the kitchen, or fronting a noisy thoroughfare; it should not be liable to be invaded by a smell of cooking from within the house, or of the stable from without; and, lastly, it should have, if possible, a dressing-room attached.

VENTILATION.—The object of ventilation is to change the air of a room sufficiently frequently to prevent it becoming stagnant and unfit for respiration. This is effected by providing for the admission of fresh air in quantity proportionate to the size of the room, and by securing, at the same time, that the foul air shall have a ready means of escape. The in-coming air should not, as a rule, be admitted by the door—*i.e.*, after being polluted by passing through other parts of

the house, but should enter direct from without, either through the window or through a ventilating inlet fixed about seven feet from the floor in an outer wall, as far from the fireplace as possible. If the door be closed, and the patient's shoulders well covered, there is seldom any risk in opening the window six inches at the top, all the day long in summer, and several times during the day in winter. If there are Venetian blinds, the blind should be lowered a foot, and so turned as to direct the current of air upwards. Exceptional circumstances, of course, occur, as in the case of extremely cold or foggy weather, and in some chest-affections, where open windows are out of the question. Care must then be taken to freshen the air as thoroughly as possible before admitting it through the door of the sick-chamber. The point always to be aimed at is to keep the air in the room pure, without chilling it or exposing the patient to a draught. There are, fortunately, several very simple contrivances by which a window can be opened, with less risk of a draught than when opened in the ordinary way. For example, the lower sash may be raised to the extent of three or four inches, and made to rest upon a plain bar of wood, an inch in thickness, extending the whole breadth of the window, so as accurately to close the opening beneath the sash. By this means, the current of air, instead of passing directly into the room at the lower part of the window, enters only at the middle, where the raised lower sash, overlapping the lower end of the upper one, directs it upwards towards the ceiling, whence it becomes gradually diffused through the room. A piece of india-rubber tubing, such as is sold for fixing around doors, may with

advantage be nailed along the upper and lower edges of the bar of wood, so as to secure accuracy of fit and noiselessness.

A somewhat similar diffusion of the in-coming current is brought about by fixing a screen of wood, or of ornamental or plate-glass, eight to twelve inches deep, across the bottom of the window inside the room. The lower sash being raised three or four inches, fresh air is admitted at the bottom of the window as well as at the middle; the current in each case is directed upwards, at the bottom of the window by the screen, and at the middle by the overlapping lower sash.

Whenever a sick-room is vacated, if only for a few minutes, the windows should be opened at the top and bottom, and the bed-clothes turned down over the foot of the bed. A fire is an admirable promoter of ventilation, and, in a sick-room, may be considered almost essential. By its means a current is kept up in the direction of the chimney, the natural outlet for the impure air.

Temperature.—Every sick-room should be provided with a thermometer, which should stand upon the dressing-table or be hung against the wall. Unless special orders are given, the temperature should be kept at from 60° to 62° Fahr. In many instances of chest and throat disease, and after certain operations, a higher temperature is necessary; the medical attendant will, in all such cases, give directions at what height the temperature is to be maintained. Two points in reference to this question of the temperature of the room are of great importance, namely, first, that it is much more necessary to keep up the warmth when patients are dressing themselves or

sitting up than when they are in bed; and, secondly, that, as the cold is greatest and the body least able to resist it in the early hours of the morning, it is particularly desirable to keep the fire up through the night, and to take every means to preserve the air of the room from becoming chilled just at that part of the day when sick persons are most likely to be injuriously affected thereby.

It is a popular tradition that it purifies the room to allow the fire to go out in the night; this, however, is quite a mistake.

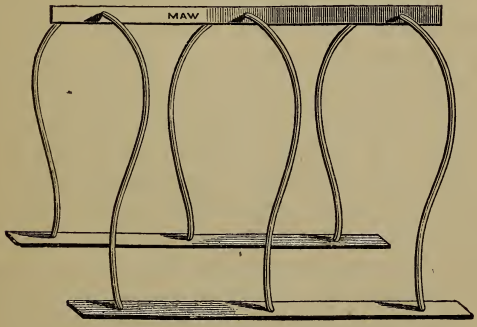
Sometimes the difficulty with regard to the temperature is not how to keep the room sufficiently warm, but how to keep it cool. If the sun is glaring too fiercely upon the windows, a dark blind or curtain should be hung temporarily before the window.

Bed and Bedding.—The bedstead should never be placed with one of its sides against a wall, as a nurse ought to be able to attend to the patient from either side. A large bedstead has this advantage, that the patient may be refreshed by being moved from one side to the other from time to time, though, in many surgical cases, and in the case of helpless patients, a small one facilitates attendance and is therefore preferable.

For use in sickness nothing is more suitable than a spring mattress, with a thin horsehair mattress above it. It forms a yielding bed, and, being clean and cool, it helps to keep the room pure. Feather beds are to be avoided for several reasons; they are apt to make a patient hot, and consequently restless; they require frequent shaking, and so involve unnecessary disturbance; and, lastly, they almost inevitably allow the patient to sink into uncomfortable hollows.

The under-sheet should be spread smoothly and well tucked in on all sides, or even stretched tightly across, and fastened to the sides of the mattress by safety-pins, which is a still more certain means of preventing it from getting wrinkled, and so becoming a source of irritation and discomfort. Heavy counterpanes should be avoided; they keep in the perspiration and other matters given off from the patient's body, and their weight also does harm. In summer nothing can be nicer as an outside bed-covering than a clean white sheet.

FIG. 1.



For bed-ridden patients several forms of invalid bedstead have been contrived with a view of obviating the necessity of moving the patient every time the bed-pan is required.

BED-FRAMES should be employed whenever it is desirable to prevent the bed-clothes from touching any injured or inflamed part of the body or limbs; they are made of different sizes, in wood, wicker, or iron. (Fig. 1.)

PILLOWS AND BED-RESTS.—Pillows should not be too soft. With regard to their arrangement, no definite rule can be laid down. One patient likes the pillows high, another low; one prefers them straight and even, another pulls a corner well down and half buries the face in it. Allowance must be made for these peculiarities.

In raising the head to shake up or alter the position of a pillow, the nurse must support the head of a helpless patient, not with two fingers, as is often done, but with the whole hand.

When patients require to be propped up, it is a great mistake to wedge in a number of ordinary pillows behind the back. Whenever practicable, hinged bed-rests with cane, wire, webbing, or carpet back should be used, one or two pillows being arranged on them according to the patient's liking. Should these not be at hand, or should the patient not be able to be propped so high, a wedge-shaped pillow-rest, stuffed hard, forms a simple and efficient substitute. This pillow-rest should be made a little longer than an ordinary pillow, and should measure, at its upper and thicker part, from eight to twelve inches; at its lower and thinner edge, not more than three or four inches. It is to be used as a support for the ordinary pillows after the manner of a bolster, and when thus arranged will be found very useful in the case of persons suffering from bronchitis and similar ailments. In propping a patient up it should always be remembered that the back needs support as well as the head and shoulders.

Netted swing or hammock bed-rests are to be had, and, for some cases, are exceedingly useful.

They are made three yards in length, and being spread out, are passed behind the patient's back, supporting him in a sitting posture (with an ordinary pillow intervening, if desired), and secured by each end to the foot of the bed. These rests, allowing a free play of air on all sides, are very cool and healthy. When not needed for supporting the back, they can be firmly fastened to the foot of the bed and used as bed-pulls to enable patients to change their posture.

THE ROLLER-PILLOW.—Patients who are entirely confined to bed, and who are paralysed or otherwise reduced to a condition of great weakness, frequently complain that they cannot avoid sliding down in bed. An attempt is often made to obviate this tendency by placing a footstool at the bottom of the bed for the patient to press the feet against. But when there is great weakness, this support soon ceases to be useful, for the muscles become exhausted, the knees give way, and the slipping goes on as before. The difficulty is best overcome by the use of a roller-pillow, which is a round pillow, about four inches in thickness, so fixed that the patient, though lying down, as it were sits upon it. To answer its purpose, the roller-pillow must be fastened very securely to the sides or head of the bedstead by means of strong tapes or pieces of webbing attached to each of its ends.

BED-HANGINGS.—With regard to bed-hangings, there can be no doubt that medical men often find curtains at the head of the bed extremely useful in preserving the head and face of the patient from currents of cold air. A carefully placed screen is, however, preferable, and will often answer the purpose equally well. Whenever curtains are used it is very desirable that

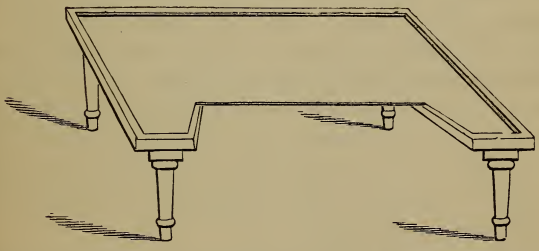
they should not be of woollen or stuff but of some washable material, and so hung as not to interfere with that free circulation of air which is so essential in a sick-chamber.

Water-beds.—In cases of protracted illness, and whenever bed-sores are apt to be formed, removal on to an air or water-bed becomes desirable. Water-beds should be filled with water at a temperature of 70° Fahr., and in cold weather and in cases of great prostration the water should occasionally, once every two weeks, for example, be renewed. The bed should be covered with a piece of waterproof sheeting, and upon that should be laid a double fold of blanket. It is a good plan slightly to raise the foot of the bedstead in order that the layer of water may be deeper at the head of the bed than at its foot. Whenever water or air-beds or pillows are used, the greatest care must be exercised to avoid pricking them with pins.

Furniture.—The furniture of the room should be of a kind which does not retain dust and bad smells, those chairs being the best which have simple wooden frames with cane bottoms. All woollen draperies are to be avoided. A couch or sofa adds to the comfortable appearance of a room, and is very often of the greatest service during the process of bed-making. Excellent invalid-couches are now to be had everywhere, of light and simple construction and capable of ready adaptation to any position. In cases of chronic illness especially, the room should be arranged so as to look as little like a bedchamber as possible; a small writing-table, with writing materials and a few books and flowers, will all help in this direction. The eye of the invalid should rest on pleasant objects; thus, the

pictures on the walls should be of a cheerful character and not hung crookedly, tawdry and obtrusive patterns should be avoided in the selection of paper-hangings, the windows should be kept clean and bright, and the bed so placed as to command a view of the fire. A small four-legged table (Fig. 2), constructed to stand on the bed, and provided with a ledge on three sides, is useful in many ways; it makes a steady and convenient dining-table; covered with a towel it may be made to take the place of washstand and dressing-table; it may be used also for writing purposes, or for

FIG. 2.



arranging flowers, or for looking over books and papers, while children find great delight in spreading out their toys upon it. When a sick person is sufficiently well to read, it is wise, for the sake of comfort and to preserve the eyes, to arrange the bed, if possible, so that the light shall fall upon the book; if the bedstead is not suitably placed, or cannot be conveniently moved, the object can often be attained by placing the pillows at the foot of the bed in the daytime and allowing the patient to lie with his feet towards the bed's head.

CARPETS.—A great deal has been said and written against the use of carpets in a sick-chamber. In all infectious diseases they are of course absolutely inadmissible, and in many surgical cases their use is incompatible with that rigidly antiseptic treatment, the results of which are the greatest triumph of modern surgery. Carpets are out of place, too, wherever the sick are congregated together, as in school-infirmaries and in hospitals. There still remain, however, many cases of illness in which strips of carpet on the floor, so far from being the pestiferous and altogether objectionable luxury they are often made out to be, possess certain very decided advantages. They lessen noise; they give the room a more habitable appearance; and they involve less alteration of the patient's ordinary surroundings. Care should be taken, however, to place strips of floor-cloth by the washstand, and, if necessary, by the side of the bed. If the whole floor be carpeted, the carpet should be covered with a crumb-cloth that can be taken away and washed.

POSITION FOR VISITOR'S CHAIR.—In placing a chair for the medical attendant, or other visitor, a nurse should remember to do it in such a way that the visitor and the patient shall face one another, otherwise the sick person has to twist the head uncomfortably in order to keep the visitor within view.

CLEANING.—It is one of the elementary lessons in nursing never to permit a slop-pail to be seen in a sick-room. All vessels containing soiled water, even when it has only been used for washing purposes, and all chamber-utensils, should be carried out of the room to be emptied, and should be well rinsed with

clean water before being brought back. In the case of the chamber-utensil and night-commode, they should be removed immediately after being used; and after being emptied and rinsed a little clean water should be poured into them, and left in when they are put back in their places. On no account should a chamber-utensil ever be put under a bed, for if it should sometimes happen that it cannot be removed the moment after use, the bedding must receive some of the noxious effluvia arising from it.

The bedroom fire must never be used for cooking purposes; otherwise the air of the apartment is rendered impure, and the patient's appetite is apt to suffer.

When the patient cannot be moved temporarily to another apartment, during the cleaning of the sick-room, the dust should be taken up from the floor by means of a damp cloth.

CHAPTER II.

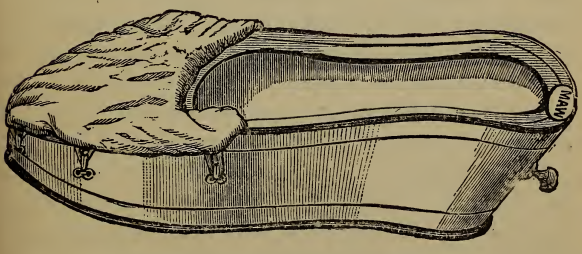
Washing of Patient—Changing Sheets—Draw-sheet—Modes of Lifting and Carrying Patients—Cold Feet—Bed-pans—Urine-bottles—Passing the Catheter for Female Patients—Cleaning Catheters.

Washing.—The hands and face of the patient should be washed every morning with soap and warm water; and the hands may be washed again, once or oftener, during the day. During a long illness a warm bath should be given once a week, or, when this cannot be done, the whole body should be washed, by means of a piece of flannel, with soap and warm water, care being taken to uncover only one portion of the body at a time. If strong enough, a patient should use a tooth-brush, and a little camphorated chalk or other tooth-powder, at least every morning. When too ill or weak to do this, the nurse should tie a small piece of lint around the end of a stick or penholder, and by this means clean the patient's teeth with warm water, to which a little Condy's fluid has been added. During sickness, morsels of food and other matters are sure to accumulate about the teeth, and, if not removed, cannot but become offensive both to the patient and those around. It is necessary, in chronic illness more particularly, to keep a watch over the condition of the skin of the back and hips, and the

nurse should very early be diligent in using means to prevent bed-sores. After the daily washing, the back should be well dusted with finely powdered starch (violet powder), mixed with an equal quantity of powdered oxide of zinc, or, still better, very finely powdered boracic acid, which is now sold under the name of sanitary rose-powder. All crumbs and wrinkles on the under-sheet must be avoided; and another valuable precaution is to harden the skin over the back and hips by rubbing in, with a piece of flannel, a little spirits of wine, or brandy, or whisky, or eau-de-Cologne. It is very grateful to the patient to moisten the hair-brush before using it with a little toilet-vinegar and water, or a solution of borax in camphor-water. In the case of female patients, the hair, if neglected during the first days of an illness, is liable to become very uncomfortably matted together and entangled; it is therefore desirable to take an early opportunity of securing it in a loose plait.

For washing the parts between the thighs, especially

FIG. 3.



after confinement, the bed-bath (Fig. 3) is very useful.

CHANGING SHEETS.—In many cases of severe illness

it becomes necessary to change the sheets without disturbing the patient. This can be done either from side to side, or from head to foot. The former method consists in rolling loosely up the soiled sheet sideways, from the side of the bed where there is most unoccupied space, until it can be pressed against the patient's side. The clean sheet, previously rolled loosely up from side to side, is then to be unrolled over the uncovered part of the bed, until the clean roll lies by the side of the soiled one. The patient is now lifted over on to the clean sheet, the soiled sheet taken away, and the spreading of the clean sheet completed.

The second plan is to roll up a clean sheet loosely from end to end. The patient's head and shoulders being raised, the soiled sheet is to be drawn down from underneath the bolster, while the clean sheet is unrolled after it, and arranged in its place. An attendant on each side should then pass one hand under the shoulder-blade of the patient, and the two hands being locked, the back must be raised, while the attendants use their remaining hand to arrange the sheets, rolling the soiled one towards the foot of the bed, and unrolling the clean sheet as it is spread out in its place. The upper part of the thighs must be raised in a similar manner, and, finally, the feet, the soiled sheet being taken away at the foot of the bed, and the unrolling of the clean sheet completed.

The changing of a patient's bed-linen must never be commenced until everything is ready. It is almost unnecessary to say that the clean linen must previously be well aired and warmed in another room.

Draw-sheet.—In many cases of illness, and after severe accidents and operations, a draw-sheet becomes

necessary. This consists of a small sheet folded lengthwise two or three times, so that when placed beneath the patient it may reach from the middle of the back to the knees. One end of the folded sheet should be the part first used, the rest being loosely rolled up to within a few inches from the patient's side. As the sheet becomes soiled, the unused portion is unrolled sufficiently for the soiled part to be drawn from under the sick person and a clean part substituted. The soiled portion is rolled up as it is withdrawn, and secured by a safety-pin. If a piece of waterproof sheeting, or a strip of thin oilcloth is at hand, it should be passed beneath the draw-sheet, so as still further to protect the bed.

In hospitals the draw-sheets are cut specially to the proper size, so that when folded into four thicknesses, they reach, as in the former case, from the middle of the patient's back to the knees. The patient's body being slightly raised, the soiled sheet is to be removed, and the folded draw-sheet, with a piece of waterproof sheeting underneath it, is to be quickly and evenly arranged in its place.

Lifting and Carrying Patients.—When patients leave their bed for the first time, it is often desirable that they should be carried, instead of being allowed to walk to the couch or sofa. A blanket should first of all be spread out upon the couch, so that it may be folded over the patient. The couch should then be wheeled with its head close up to the foot of the bed, whenever there is room enough, so that the bearers may not have to wheel round with their burden, but, by moving in step two or three paces to right or left, as the case may be, may carry the patient feet fore-

most, and lay him down with as little disturbance as possible. In lifting a very helpless person, three bearers are required, and they must arrange themselves in this way:—Two of them stand by the side of the patient, one on his right and the other on his left, clasping one pair of hands firmly under the patient's back, at the lower part of the shoulder-blades, and the other pair beneath the upper part of the thighs; the third takes charge of the head, or the injured limb if there be one.

In lifting a patient from a bed, the width of the bed, or the fact of there being a high footboard, frequently prevents the carrying out of the plan just described, and the two principal bearers have, in that case, to stand side by side, instead of one on each side of the patient. The first attendant then passes one arm beneath the shoulders, and the other beneath the middle of the back, whilst the second attendant places one arm under the lower part of the back, and the other under the two knees.

If one nurse is sufficient for the duty of carrying the patient, she must with one arm support the two knees, and with the other the broad part of the back, just below the shoulders. She must pass her arms well under the patient before she commences to lift.

Where it is of much importance that a patient should be carried perfectly straight, as in the case of a broken thigh, the best way is to get two poles, or long brush handles. One pole is placed on each side of the patient, and the under-sheet and blanket firmly rolled around it. Four attendants take their places, two at each side. Each grasps with one hand the end of one of the poles surrounded with the sheet, and

with her other hand the pole near its centre. Being thus prepared, the patient is raised and carried, as if on a stretcher, feet foremost, over the foot of the bed to wherever it is desired to remove him.

After certain injuries, and during convalescence from illness, a patient may be able to adopt the sitting posture, and yet be quite unfit to walk, in which case he may easily be carried by two nurses in the following manner:—Each nurse grasps with her left hand the middle of her own right fore-arm, the backs of both hands being held uppermost; nurse A. then grasps with her right hand the middle of the left fore-arm of nurse B., while B. grasps the fore-arm of A. exactly in the same way. Thus a square seat is made, known to schoolboys as the sedan-chair. The person to be carried rests his arms on the shoulders of his bearers, who, in moving forward, must walk sideways, advancing one foot only at a time, and being careful to keep step.

Very often the sick or injured person will walk fairly well, provided he has a little assistance. It is very important for a nurse to know how she can best render the assistance required, and still leave both herself and the patient free to walk. She should stand by the side of the patient, and, passing one arm behind his back, place her hand firmly on the hip further from her. Meanwhile the patient rests the arm nearer to the nurse upon her shoulders, letting his hand fall sufficiently forward over the further shoulder for the nurse to grasp it firmly with her disengaged hand.

In turning helpless patients on to their side for the purpose, for example, of sponging the back, or admin-

istering an enema, a nurse should first of all let the patient lie as straight as possible, with his arms by his side, and his legs close together and fully extended. She should then, instead of pushing him over, pass both arms underneath him, one under the chest and arms, the other under the hips, carrying her hands far enough to grasp him on the further side, and should thus *pull* him gently over on to his side.

Cold Feet.—Many sick persons suffer great discomfort from cold feet, particularly in the morning, which is unfortunately just the time when, in the hurry of other work, little matters like this are in danger of being disregarded. A nurse should invariably, as a matter of daily routine, ascertain whether the feet are warm, and, if they are not, should lose no time in applying an india-rubber or earthenware hot-water bottle, wrapped in a fold of thick flannel. These foot-warmers should never be so hot as to be uncomfortable to the nurse's own hand, and should be renewed every eight hours. Persons whose feet are apt to be cold during the whole day, should, when confined to bed, wear woollen night-socks. For cases of this kind, the best mode of applying external warmth is by means of heated sand-bags, made of ticking or chamois-leather, and half-filled with sand; they can be moulded, as it were, to fit closely against the soles of the feet, and they retain their heat for a considerable time. The necessity of keeping up the warmth of the body is particularly urgent in children and in the aged, and in the case of patients suffering from diarrhœa.

Bed-pans should be made of earthenware in preference to metal. Two forms are in ordinary use, the

round pan and the slipper; of which the former is the more generally servicable for men, and the latter for women, except where it is required to serve as a receptacle for vaginal injections. The round pan is simply passed from the side of the bed, beneath the raised body of the patient, sufficiently high up under the back to prevent the pan from tilting. The slipper is passed in the following manner:—The patient's knees having been drawn up, the slipper is passed under them, and the thin end gently wedged under the lower part of the back. Both require a flannel cover, which may be fastened by drawing a tape through the hem and tying the ends. After having been removed, the pan should immediately be covered over, carried out of the room, emptied, and well rinsed with water. After the rinsing, a little solution of carbolic acid, 1 in 20, or other efficient antiseptic, should be placed in the bottom of the pan, and allowed to remain in it. It will help to keep the room free from smell, if the disinfectant solution be poured into the pan immediately before, and again immediately after it is used. In fevers and other infectious disorders this precaution must never be neglected.

URINE-BOTTLES.—For receiving the urine of male patients, special urine-bottles can be obtained; those devised by Sir H. Thompson, with a view to prevent the possibility of the urine flowing back and soiling the bed, being undoubtedly the best. For females, slipper bed-pans are the most convenient vessels for the purpose.

PASSING THE CATHETER FOR FEMALE PATIENTS.—For this purpose a flexible male catheter of a moderate

size (No. 8 answers very well) will be generally more convenient than the ordinary female catheter of the shops. The nurse's hands should first of all be rendered aseptic, by washing them well with soap and hot water, using a brush for the nails, and then after rinsing the soap off, holding them for a minute in a solution of corrosive sublimate, 1 in 1000. The external genitals should then be carefully cleansed with an antiseptic solution, preferably with a solution of corrosive sublimate, 1 in 2000.

The mode of passing the instrument is as follows: —The patient lies on her back, conveniently near to the right side of the bed, and draws up her knees; the nurse then, passing the left hand over the patient's thigh, introduces the forefinger first of all into the vaginal orifice, and then feels for the opening into the urethra, which lies just above the entrance into the vagina. There is a little soft fleshy projection at the mouth of the urethra which is a good landmark; having found this, the nurse will have little difficulty in making out the small round opening of which she is in search. The catheter, previously smeared with carbolized vaseline, a solution of corrosive sublimate in glycerine, 1 in 1000, or other antiseptic lubricant, is then taken in the right hand, passed under the patient's knee, and guided into the little orifice by the forefinger which has already been employed in making out its position. The female urethra is very short, and its direction nearly straight upwards, so that when once the point of the catheter has entered the urethra, the instrument slips readily forward into the bladder. No force should be used; if the instrument does not go in easily, it is a proof that the point has not

exactly hit the mouth of the urethra, and a further search must be made. Should the instrument pass readily, and no urine make its appearance, it is most probable that the catheter has slipped into the larger opening just below the urethra, that of the vagina, which can easily be ascertained by examination with the left forefinger. When the flow of urine has commenced, the nurse has simply to hold the instrument in position until the bladder has been emptied. In withdrawing the catheter, the spilling of drops of urine upon the patient's skin, or the bed, may be entirely prevented by closing the mouth of the tube with the finger during its removal, or, where tubing has been attached to the end of the catheter, by pinching the india-rubber tube. In either case it must be remembered that the catheter will contain a few drops of urine, which must not be allowed to run out upon the bedclothes.

When a nurse has any difficulty in carrying out the directions given above, or has not had sufficient practice to enable her to pass the instrument under the bedclothes, she must place the patient on her left side, with the knees bent, at the edge of the bed, and ascertain the position of the urethra by using her eyes.

CLEANING CATHETERS.—A catheter, after being used, should be washed by holding it, with the eye upwards and mouth downwards, under a tap, and allowing a stream of water to run through it in the same direction in which the urine has run through—*i.e.*, from the eye downwards. The instrument should then be well rinsed in a basin, containing an antiseptic solution—*e.g.*, corrosive sublimate, 1 in 1000, or car-

bolic acid, 1 in 20. An excellent plan is to keep the catheter, placed eye downwards, in a tall narrow glass half filled with a solution of corrosive sublimate in glycerine, 1 in 1000. This will destroy any germs that may, in spite of the washing, still linger in the instrument, and, at the same time, prevent fresh contamination.

There can be no doubt that mischief is frequently set up in the bladder from the use of catheters not rendered thoroughly aseptic; hence it is scarcely possible to bestow too much pains on their purification.

CHAPTER III.

Sick Diet : Instructions to be in Writing—Daily Record —Cold Water—Uses and Preservation of Ice—Persistent Vomiting—Serving of Food—Avoidance of solid food, or food with solid residue, in Typhoid, Inflammation of the Bowels, &c.—Directions for preparing strong oatmeal gruel, boiled bread and milk, beef-tea, restorative gruel, chicken broth, rice-caudle, sago, tapioca, arrowroot, barley-water, toast and water, linseed-tea, lemonade, rhubarb-water, apple-water.—Peptonized foods.

The kind and quantity of the food, and the frequency with which it is to be given, are in every case determined by the medical practitioner in attendance. Where the directions are of other than the simplest kind, they should be written down for the nurse's guidance, and that they may be carried out with accuracy, the nurse should take pencil and paper and construct a time-table, noting the hours at which nourishment, stimulants, and medicine respectively fall due. If a little mark be placed against each when it has been duly given, and a line drawn through whatever has been omitted, the paper will serve as a faithful report of what the patient has had, and will be very useful to the medical attendant.

When a milk diet is ordered, it is a good plan to

set aside, night and morning, a jug containing a certain known quantity of milk; this being kept for the patient's sole use, the doctor can be informed of the exact quantity the patient has been able to take. Milk should always be boiled before it is used, in order that any infectious germs that may have found their way into it may be destroyed. It could not then be a carrier of infection, as it has been proved to be in many recent outbreaks of typhoid and scarlet fever.

There is an old tradition that in acute illness it is unsafe to drink cold water. This is a fallacy, and one that has caused a very great deal of needless suffering, especially to children. Unless the medical attendant has given express orders to the contrary, nurses are justified in giving patients cold water to drink whenever they desire it.

Thirst is often greatly relieved by sucking small pieces of ice; and ice is also, with great advantage, used to cool the drinking-water and such effervescing waters as may be prescribed. Only a small quantity must be kept in the sick-room, the remaining stock being placed in the ice-chest, if there happen to be one, and, if not, folded in a piece of thick flannel and carried into the cellar, or some equally cool place. To prevent the supply which is kept in the room from melting too rapidly, the following simple and ingenious contrivance has been suggested:—Cut a piece of coarse flannel large enough to dip, funnelwise, halfway down an empty tumbler, and to fold over the edge of the tumbler sufficiently to allow of its being secured by an elastic band or a piece of string tied around the top of the glass. Place the ice, broken

ready for use, in the flannel cup, and lay a flannel cover over the top. As the ice melts, the water drains through the flannel and falls to the bottom of the glass. Should the flannel not be of sufficiently open texture for the water to pass through quickly, a number of small holes must be made in it. If ice is allowed to stand in water, it melts very quickly; so that it is preserved longer by thus draining the water off as fast as it is formed. It is a very wasteful practice to break it with a hammer; the proper plan is to split off pieces of the size needed by means of a strong pin.

PERSISTENT VOMITING.—When repeated vomiting interferes with the giving of food, the proper course is to withhold food altogether and allow the stomach a little rest. Meanwhile, small pieces of ice may be given to the patient to suck, from time to time, to allay the distressing thirst.

The vomiting, which often follows the administration of an anæsthetic, is generally best relieved by a tea-spoonful or two of moderately hot (not tepid) water, frequently repeated. In other cases, too, of persistent vomiting, when the sucking of small lumps of ice fails to arrest it, this plan of administering, at frequent intervals, small quantities of tolerably warm water, will often succeed.

As soon as the vomiting appears to have ceased, a very small quantity, for example, a table-spoonful, or even a tea-spoonful, of barley-water or iced soda-water, or of a mixture of equal parts of milk and soda-water, should be tried, and, if this be kept on the stomach, it should be repeated every ten minutes or quarter of an hour. As the sickness abates, the

interval may be cautiously lengthened, and the quantity of fluid increased, until the patient is able to return to his customary diet.

SERVING OF FOOD.—Those patients who are only able to take fluids, require feeding in small quantities and frequently. The most usual plan is to give nourishment, in stated quantity, every two hours; in certain severe cases, however, it requires to be administered every hour, or even every half-hour. When a patient is well enough to take solid food, his meals should generally be served at intervals of four hours. Whatever the interval may be, whether two hours or four, the food must be ready punctually.

Food served up for the sick should always be less in quantity than is required rather than more, and should be presented to the patient in the most tempting manner possible. Many an invalid's appetite disappears entirely if the greatest care be not exercised in these little points. It is always better that a second supply should be asked for, than that a considerable portion should be sent away. When a meal is finished, all that remains over should be cleared away at once. Patients soon come to loathe the very idea of eating when fragments of the last meal are perpetually before their eyes. Moreover, it is not good for a patient to be continually nibbling between meals. The stomach requires rest, and a person will be much more likely to enjoy his food, if he have had time to become hungry since his previous meal. It is notorious that, as a rule, patients in hospitals eat much more food, and with keener appetite, than they do in their own homes; and this is no doubt largely owing to the regularity with which the meals are

served, and to the fact that the patients get nothing to eat during the intervals.

In all cases where the patient is too ill or is forbidden to sit up in bed, a feeding-cup with a curved spout should be used, a clean towel having previously been pinned loosely round the neck. Should the head need raising, the nurse's hand should be passed well beneath the pillow, the head and pillow being gently raised together. Where there is extreme prostration, a glass tube bent at a right angle, of which one end is placed in the vessel containing the food and the other in the patient's mouth, will enable fluids to be sucked up with scarcely any effort.

Only when special orders are given should patients be awakened to take nourishment, but if a meal is overdue when they awake, no time should be lost in serving it. Similarly, patients should not be kept long without their breakfast after awaking in the morning; when the hands and face have been washed, and the teeth brushed, the meal should be served with as little delay as possible.

Milk is the food chiefly to be relied upon in most fevers. In typhus, recovery often depends on persistence in the administration of nourishment, and where necessary, of stimulants, even where there seems little room for hope. The danger in this form of fever is lest the vital powers should not last out until the time arrives for the fever to abate, and the great object is to sustain them. When the temperature in typhus becomes natural, and the patient asks for solid food, it may be given, provided it be of a light and digestable kind. In typhoid, on the other hand (a form of fever always attended with more or less ulcera-

tion of the inner coat of the bowel, so deep sometimes as to leave the wall not thicker than tissue-paper), the nurse must on no account give solid food of any kind whatever, from the beginning of the illness to the full establishment of convalescence, even although the patient become ravenous and importunate. For if the ulcers are not yet healed, solid food would be very apt to cause the bowel to give way, an accident which is generally fatal. Even milk, if given in large quantities, may prove injurious in typhoid, from the irritation caused by the formation in the bowels of masses of undigested curd. In this form of fever, therefore, unless the milk is peptonized previously to being administered, preference is to be given to beef-tea, beef-jelly, chicken and other animal broths, whey, gruel, &c.

Similarly, in inflammation of the bowels, after operation for rupture (strangulated hernia), and in diarrhœa, solid food must be entirely avoided, until permission to the contrary is obtained from the medical attendant.

Stimulants should of course never be given except by direction of the medical attendant, and the quantity ordered must always be carefully measured in a graduated measure-glass.

There is a right way, and there is a wrong way of making even such simple things as gruel and beef-tea; a few directions are therefore here given for the preparation of some of those articles which are in most frequent request in a sick-room.

Oatmeal Gruel.—Take two table-spoonfuls of oatmeal, and mix them smoothly with a little cold water. Add this to half a pint of cold water in a saucepan,

stirring all the time, and boil slowly for at least half an hour. An additional quarter of an hour's boiling will make it all the smoother. It is then to be strained and a little salt or sugar added according to taste.

Boiled Bread and Milk.—Stale bread should be used for making boiled bread and milk. Small square pieces cut so as to be of nearly equal size, are to be placed in a basin that has been scalded out. Boil the milk, and the moment it rises pour it over the bread; cover the basin with a plate for ten minutes.

Beef-tea, First Method.—Take one pound of perfectly lean beef, cut it up into small pieces, and put it into a saucepan. Take one mutton shank, without much meat and having the bone broken, wash it in cold water, and put it into the saucepan along with the beef. Add to these three pints of cold water, and half a tea-spoonful of salt; allow to simmer over a gentle fire for two hours and a half. Strain and thicken with vermicelli or arrowroot.

Take the yolk of an egg, beat it up a little and add a pinch of salt. Add this very gradually to a cupful of the hot beef-tea.

Beef-tea, Second Method.—Cut up as finely as possible a quarter of a pound of lean beef, from which all fat has been carefully removed. Put the beef into a jar and pour over it half a pint of cold water. Stir it well, add a little salt, and let it stand for two or three minutes. Put a paper cover over the jar, set it in a pan and allow it to simmer gently for twenty minutes.

Beef-tea, Third Method (*raw*).—Put into a cup two ounces of perfectly lean beef, as juicy as can be obtained; pour over the beef, cut into as small pieces

as possible, two table-spoonfuls of cold water; stir a little and set aside for twenty minutes. The meat will then have a blanched appearance. Strain off the juice and give it just as it is. Beef-tea made in this way should never be kept longer than an hour and a half.

Restorative Gruel.—Take an ounce each of rice, barley, and fine sago; wash each in cold water; put them into a saucepan, and add a quart of cold water. Set on to a gentle fire, and simmer slowly for an hour and a half. Placing a hair sieve over a bowl, press the thick part through, adding a little of the liquid occasionally.

Boil in a saucepan, adding a table-spoonful of sugar for each pint of gruel. Pour into a basin, with four table-spoonfuls of cream, or, ifordered, two table-spoonfuls of port wine.

Strong Chicken-broth.—Remove from a chicken the skin, lungs, liver, &c.; cut the meat from it lengthwise in large strips; then take a sharp knife and cut these strips, across the fibres of the meat, into thin shavings, removing as much of the fat as possible; put the shavings into a jar; add one salt-spoonful of salt, and pour over these as much cold water as will just cover them.

Mix up the slices of chicken with the water, so as to prevent the meat from forming a solid mass in the jar; cover the jar with paper; have in readiness a saucepan containing as much cold water as will reach to one inch from the top of the jar; when the jar is placed in it, simmer gently on a slow fire for an hour and a quarter, the saucepan being lightly covered. The bones of the chicken are meanwhile to

be broken up and placed by themselves in a pint of water, to which has been added a pinch of salt, and allowed to simmer gently until the above is ready. Take all the meat of the chicken out of the jar and pound it thoroughly, adding by degrees a little of the liquor from the bones, and a little water. Press the meat through the back of a hair sieve into a bowl, crushing it through with the back of a wooden spoon.

Take a tea-cupful of the broth made from the bones, and, having first removed by means of a piece of paper any grease there may be on the surface, pour this with the thick meat broth into a saucepan; add four table-spoonfuls of cream, or of milk, if cream be unobtainable or forbidden, and a little salt and pepper; set the saucepan on the fire, and boil up.

Rice-caudle.—Wash a table-spoonful of rice in cold water; boil half a pint of water in a saucepan over the fire; put in the rice, and boil until it is quite smooth and thick enough to be agreeable. Add some sugar and a little powdered nutmeg or cinnamon, according to taste.

Sago and Tapioca should be soaked in cold water for five or six hours, and then allowed to simmer in the same water until the grains are clear and jelly-like.

Boiled Arrowroot.—Mix a dessert-spoonful of arrow-root with a small quantity of cold water; add gradually half a pint of boiling water or boiling milk; then boil for five minutes, stirring the whole time.

When wine or brandy is ordered to be given with any of the above, it should be added when the liquids have cooled sufficiently for the patient to take them, and not before or during the boiling.

Barley-water.—Wash two ounces of pearl barley

several times in cold water, which must be thrown away. Put the barley into a pan, along with a little white sugar and thin rind of lemon; pour a quart of cold water over it; let it simmer gently for an hour; add the juice of half a lemon, and strain.

Toast and Water.—Slowly toast a quarter of a pound of bread, with the crust left upon it, until the colour is deep brown. During the toasting the bread must be frequently turned. It should first be held at a little distance from the fire, and afterwards brought nearer to it. Scald out a large jug, and place the toast in it; pour over it three pints of boiling water; let it stand lightly covered until it is cold, and strain.

Linseed-tea.—Wash two ounces of linseed by putting them in a small strainer, and pouring cold water through it; take off, as thinly as possible, the yellow rind of half a lemon; to the linseed and lemon-rind add a quart of cold water, and allow them to simmer for an hour and a half. Strain away the seeds, and to each half-pint of tea add a tea-spoonful of sugar and some lemon-juice, in the proportion of the juice of one lemon to each pint of tea.

Lemonade.—To make good lemonade, two lemons should be used for each pint.

Take off, as thinly as possible, the whole of the yellow rind, avoiding entirely the white layer beneath, which gives a bitter flavour to the lemonade; put the slices of rind into a jug; add two ounces of lump sugar; cut the lemons and squeeze the juice through a strainer into the jug; pour over these a pint of quite boiling water; allow the jug, lightly covered, to stand aside until the lemonade is cold; then strain for use.

Rhubarb-water.—Take about eight ounces of rhubarb; wipe clean with a cloth; cut up into as thin slices as possible; put into a jug; add three ounces of castor sugar, the yellow rind of half a lemon, the juice of one lemon, and a quart of boiling water. When cold, strain for use.

Apple-water.—Take two apples; peel them; take out the core, and slice up thinly. Take a small piece of the yellow rind of lemon, just enough to give a flavour, and put this with the sliced apples and a little sugar into a jug; pour a pint of boiling water over them; and when cold, strain ready for use.

The commencement of the apple season is the most favourable time for making good apple-water.

Peptonized or Artificially Digested Food.—Excellent results have recently been obtained, in the treatment of patients suffering from impaired digestion, and various other diseases, by administering food in a peptonized or partially digested condition, and so rendering it fit for immediate absorption. The use of foods so prepared has become especially popular since Sir William Roberts, in his Lumleian Lectures for 1880, directed attention to their great value and importance.

"The extreme solubility of digested products—whether of starch or of proteids—detracts from their acceptability to the healthy. To them they appear thin and watery—they miss the sense of substance and solidity, which is characteristic of their ordinary food. But to the weak invalid without appetite this sense of substance or thickening is generally an objection, and they take with more ease an aliment which they can drink like water."

CHAPTER IV.

Administration of Medicine : Measure-glasses, Times for giving Medicine, Nauseous and Oily Medicines, Effervescing Medicines — Pills — Powders — Electuaries — Suppositories — Medicated Pessaries — Subcutaneous Injections — Emetics — Enemata — Vaginal Douche — Vaginal Injections — Liniments — Gargles — Collyria — Eye-drops — Inunctions — Inhalations.

Nurses should never, by any chance, omit to read the directions on the label of the medicine-bottle, before giving the medicine. Attention to this rule would have prevented many very serious, and not a few fatal, mistakes.

Every bottle of medicine should be well shaken before a dose is poured out, and during the pouring the bottle should be held with the label-side upwards, in order to preserve the legibility of the directions.

Measure-glasses should always be used, for, though the old custom still prevails of prescribing medicine in tea-spoonfuls and table-spoonfuls, yet in practice spoons are found to vary so much in size, that a more definite and accurate method of measuring is necessary. They are sold by all chemists, and are generally marked by a number of lines corresponding with the doses most commonly ordered, commencing at a tea-

spoonful and running up to four table-spoonfuls. Sometimes the only measure-glass obtainable, instead of being divided into spoonfuls, marks only fluid-drachms and fluid-ounces, but this can be used just as well as the other, provided it be borne in mind that by spoonfuls certain definite measures are intended to be understood. Thus—

one tea-spoonful	means	one fluid-drachm.
two tea-spoonfuls	,,	two fluid-drachms.
one dessert-spoonful	,,	three fluid-drachms.
one table-spoonful	,,	half a fluid-ounce, or four fluid-drachms.
two table-spoonfuls	,,	one fluid-ounce, or eight fluid-drachms.

Two kinds of measure-glass are sold—one cup-shaped, the other tapering towards the bottom like a wine-glass; of these, the latter is to be preferred, because it measures small quantities with greater accuracy. When minim or drop doses are ordered, the medicine should not be dropped from the bottle, but measured in graduated minim measure-glasses, as the size of drops varies according to the shape of the bottle and the nature of the fluid.

It is of great importance, when medicine is being measured out, that the glass should be held by its base, perfectly straight, and at such an elevation that the marks on the side of the glass are on a level with the nurse's eye. If no special directions are given as to the time of administering the medicine, it is proper to give it, when ordered to be taken three times a day, midway between meals, that is, about eleven, three, and seven o'clock. When it is directed to be taken more frequently, at least half an hour, except in special

instances, should intervene between the giving of food and the giving of medicine. The special exceptions to this rule are a few of the more powerful tonics, as, for example, the preparations of iron and arsenic, and cod-liver oil, which, being found to agree better when given on a full stomach, are usually ordered to be taken either during or immediately after a meal. Preparations of iron may be taken through a glass tube, bent at a right angle, so as to prevent discoloration of the teeth and to a certain extent hide the taste. The taste of nauseous medicines may often be avoided by compressing the nostrils during the act of swallowing. The mouth should immediately afterwards be well rinsed with cold water, and then a crust of bread or small piece of dried bitter-orange peel may be chewed to remove any lingering traces of the disagreeable flavour.

Separate measure-glasses should be kept for cod-liver oil and for oily medicines generally. There are several ways of disguising to a certain extent the taste of cod-liver oil. It may be shaken up in a bottle, just before being taken, with some warm milk, or it may be given floating upon a table-spoonful of the compound decoction of sarsaparilla, the liquorice in which serves to mask the taste. Several leading chemists now supply both castor oil and cod-liver oil which are as nearly as possible free from unpleasant taste.

Castor oil may be shaken in a bottle, immediately before being taken, with three or four times its bulk of hot milk.

Effervescing medicines should be given in a tumbler, the prescribed dose of lemon-juice, or of the acid

mixture, as the case may be, being measured and poured into the tumbler first, and the dose of the alkaline mixture added from the measure-glass at the last moment, when the tumbler is already in the patient's hand. A more perfect mixture of the two fluids is thus ensured, and a more satisfactory effervescence, than when the acid is added last.

Bottles of medicine should be recorked without delay after pouring out each dose, as not unfrequently some of the ingredients are volatile and lose strength if exposed to the air.

Pills.—Some patients find pills the easiest of all medicines to take, while others experience the greatest difficulty in swallowing them. For the latter class it is sometimes helpful to enclose the pill in a morsel of bread, or of preserve, a draught of water being taken to wash it down. Coated pills and tasteless pilules are now much used, and in this way any difficulty that might arise from their disagreeable taste is overcome. Care should, however, be taken that the coating is soluble in the juices of the stomach, lest the pill pass undissolved through the body. The French method is to "put a small piece of damped rice-paper into a table-spoon, and then fold it round the pill or pills. The spoon is then filled with water, and placed well back in the throat of the patient, who swallows the mass without difficulty."

This plan of putting medicine into a spoon, and placing it far into the mouth, is a very good one to adopt in the case of children, and is, moreover, useful to be borne in mind when dealing with patients who are in a state of unconsciousness or extremely weak.

Powders are an unpleasant form of medicine at

the best; they may be given dry on the tongue, or, if too large to be thus administered, they may be stirred up in a little water (which must be swallowed quickly, lest some of the powder be left behind), or mixed with a little treacle or preserve, or, still better, wrapped in a small piece of damped rice-paper as already described.

An ELECTUARY is a form of medicine of the consistence of stiff jam, generally containing an aperient made palatable by the addition of honey or sugar. It is given in a tea- or dessert-spoon, according to the dose ordered.

SUPPOSITORIES are little masses shaped like a diminutive sugar-loaf, for introduction into the rectum or lower bowel. They are made of various medicinal substances, mixed with cacao-butter or some material which melts slowly in the bowel, leaving the medicine free to become absorbed. They may be passed by the patient himself, or, if that be impracticable, the nurse does it for him in the following manner:—The patient is turned on to the left side, with the knees well drawn up towards the body, and brought to the edge of the bed. The nurse then, having anointed her right fore-finger with olive oil or vaseline, passes the suppository, smaller end foremost, into the bowel, pushing it gently at least an inch up the canal. The finger must be withdrawn carefully, otherwise the suppository will be in danger of being expelled at the same time.

NUTRIENT SUPPOSITORIES are frequently ordered when food cannot be retained by the stomach. They are larger than most medicated suppositories, but are of the same shape and administered in the same way.

MEDICATED PESSARIES are like suppositories, but larger, and are used as a means of introducing remedies into the vagina.

SUBCUTANEOUS OR HYPODERMIC INJECTIONS.—The method of administering medicines by injecting them, dissolved in a few drops of liquid, into the loose tissue immediately beneath the skin, is one of great value and of constantly extending application. Remedies thus introduced act much more powerfully and rapidly than when given by the mouth. As a rule, subcutaneous injections should be given by the medical attendant himself; but as he may, under certain circumstances, direct the nurse to give them, it will be convenient to describe how that should be done.

The quantity of fluid to be injected is drawn up by means of a piston into a little instrument called the subcutaneous or hypodermic syringe, the body of which is of glass, marked to show the number of drops. This syringe is fitted with a hollow needle for the purpose of piercing the skin. It usually happens that bubbles of air are sucked up along with the fluid, and in order to get rid of these, the syringe must be held with its point upwards, and the bubbles, being first coaxed by a little tapping to the surface of the fluid, are then to be forced out by pressing the piston while the instrument is still inverted. When the required number of drops has been drawn up, free from air bubbles, a fold of skin on the outer side of the upper-arm (not the fore-arm, where the tightness of the skin renders the operation needlessly painful), is pinched up between the finger and thumb of the left hand, the needle, held slantingly, is pushed quickly through the skin, the point being moved about a little

to make sure that it has passed fairly through the skin and plays freely in the loose tissue beneath, and the fluid slowly injected. The needle is then rapidly withdrawn, and the finger placed over the puncture for a few seconds to prevent the fluid from escaping. The operation, if done dexterously, is all but painless. The injection may also be made under the skin of the thigh, or the back immediately below the shoulder-blades.

EMETICS are administered with the object of producing vomiting, as, for example, in cases of croup and where poison has been taken. They may be given either in the form of a draught or powder. The most useful of all emetics, because it is fairly efficacious, and can be had promptly in every house, is powdered mustard, of which a dessert- or table-spoonful should be mixed with a tea-cupful of luke-warm water. The other more important emetics are sulphate of zinc, which is chiefly adapted for adults, and ipecacuanha, which is usually preferred for children. The emetic dose of sulphate of zinc for an adult is from thirty to forty grains, which should be given dissolved in a tea-cupful of warm water. The emetic dose of ipecacuanha wine, which, though not the best, is the usual form of administration, is, for adults, a table-spoonful or upwards, for children under two years of age, a tea-spoonful. That of simple ipecacuanha powder,* which is a much more certain preparation, is, for adults, fifteen to thirty grains,

* As the *compound* ipecacuanha powder contains as much opium as ipecacuanha, and is prescribed for an entirely different purpose, it is important not to omit the word "simple."

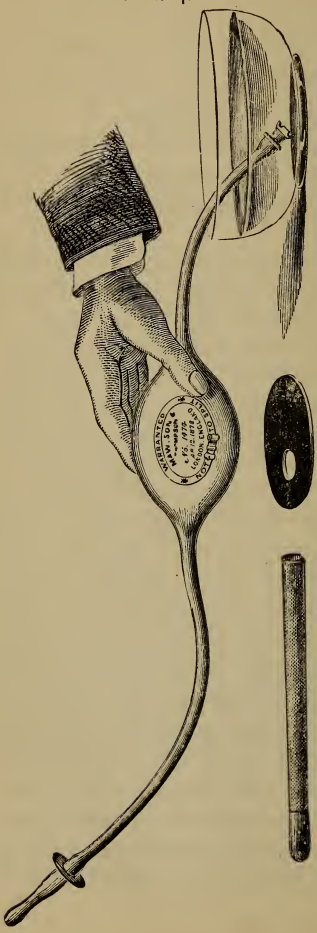
and for children, six to twelve months of age, two to three grains, either dry or mixed with a little warm water. Immediately that an emetic is administered, a basin should be placed in readiness, as vomiting may take place quite suddenly; and whatever the form of emetic selected, half a pint of lukewarm water should be given after each act of vomiting.

ENEMATA.—Injections into the bowel, or enemata, are given for the purpose of emptying the bowel of its contents, and of administering medicine or nourishment.

Of the instruments in common use, the syringe known as Higginson's is the simplest. It consists of an oblong bulb or hand-pump of india-rubber, to which an india-rubber tube is attached at each end, communicating with the bulb by means of valves. One of these tubes terminates in an ivory or bone nozzle with a shoulder-piece, for introducing into the bowel; the other is fitted at its extremity with a perforated metallic cap, through which is drawn up the fluid to be injected. A syringe can now be had, made in one continuous piece, without seams or ribs (Fig. 4), which obviates the great objection to the ordinary Higginson, namely, its tendency to split along the seams and become leaky at the joints. When the instrument has been used it should not be put away in a box, which necessitates the folding of the tubes upon themselves and is apt to crack and spoil the india-rubber, but hung up by a loop fastened round the metallic end, in which position the valves remain open, so that any contained fluid readily runs out. Whatever be the apparatus selected, a quantity of warm water should be pumped through before

using it. This precaution not only warms the instrument but tells us whether it is in good working order, and serves to drive out the air. This having been attended to, the fluid to be injected, which should have a temperature of about 95° to 98° Fahr., is placed in a vessel upon a chair by the side of the bed; the patient is told to lie on the left side, with the knees drawn up, at the edge of the bed, which should be protected by a piece of macintosh and a folded sheet. The nozzle of the syringe, previously oiled or smeared with vaseline, is passed gently into the bowel up to the shoulder-stay, and held in position by the nurse while she slowly and gently pumps in the amount of fluid required. In the case of an ordinary aperient enema, a pint or more of fluid will be usually necessary. Should the injec-

Fig. 4.



tion give rise to griping pain, the nurse should desist for a few seconds, until the pain ceases. After withdrawing the nozzle, a folded towel should be pressed against the anus, and the patient enjoined to retain the fluid, if possible, for some minutes, when it may be allowed to pass away into a conveniently placed night commode, or, if the patient is too weak or ill to rise from the bed without risk, into a bed-pan or even an ordinary chamber utensil held closely against the patient's body as he still lies on his side. Should any difficulty be experienced in introducing the nozzle or injecting the fluid, it will in all probability be owing to the tip of the nozzle having become imbedded in the contents of the bowel, or entangled in a fold of its lining membrane; in either case the proper course is to draw the nozzle back a little, and, in re-introducing it, to alter its direction slightly, when, for the most part, the difficulty will be overcome.

The most useful aperient enemata are soap-and-water, thin oatmeal-gruel, warm salt and water (made by dissolving a table-spoonful of salt in each pint of water), and lastly, warmed olive or linseed oil.

Enemata, consisting of two tea-spoonfuls of pure glycerine, undiluted with water, will often ensure a satisfactory action of the bowels. Small syringes, of glass and vulcanite, specially constructed with this object, are now to be had from every chemist.

Astringent enemata are usually ordered for the relief of incessant straining during an attack of diarrhœa or dysentery, and are best given by means of an india-rubber syringe, capable of containing two ounces of fluid. It is not desirable to inject more than this quantity, or the bowel might not retain it

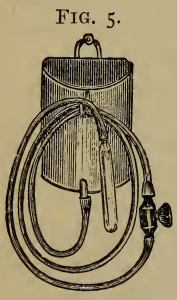
long enough to have the desired effect. For the relief of pain or straining, and as an astringent in obstinate diarrhœa, the enema most commonly prescribed consists of half a tea-spoonful of laudanum, added to about two ounces (four table-spoonfuls) of thin boiled starch. Other medicines may, however, be prescribed, but in any case the quantity injected should be small, and the operation performed very slowly.

Where food cannot be taken by the mouth, nourishing enemata, consisting of milk, yolk of egg, strong beef-tea, and occasionally brandy, have many times been the means of saving or prolonging life. Here again the quantity injected at one time should be small, not exceeding four ounces (eight table-spoonfuls).

An excellent formula for a nourishing injection is the following:—Three ounces of strong beef-tea with half an ounce each of cream and pale brandy.

Vaginal Douche.—The best instrument for the douche consists of a metallic vessel, capable of containing from one to two quarts of fluid, which is to be hooked against the wall at a suitable height. At the bottom of the tin is an opening into which is fixed the end of a long tube, furnished with a stopcock, and terminating in a perforated nozzle of vulcanite, the perforations being at the sides of the nozzle and not at the tip.

Fig. 5.



Some of the fluid should be allowed to run through the tube before it is used, not only to warm it, but to prevent the passage of air-bubbles into the vagina.

The tap should also be turned off before the vessel is empty; otherwise, bubbles of air will pass and make a gurgling and disagreeable sound.

Leiter, of Vienna, has devised an irrigating apparatus, which is made of glass, in the form of a funnel. The lower opening is fitted with a vulcanite plug, to which the india-rubber tubing, with the pipe to be used, is attached. The apparatus is filled by the neck, like an ordinary bottle, and may either be suspended against the wall, or made to rest on a high shelf or other convenient place, or it may be supported on the nurse's shoulder. Its advantages are, that it can be kept cleaner than metallic irrigators, and that, on account of its funnel shape, the water flows with a greater and more uniform pressure than from the ordinary forms of irrigator. It can be used not only for administering the vaginal douche, but also for irrigating wounds, for artificial feeding, and for washing out and injecting the stomach, bladder and rectum.

VAGINAL INJECTIONS are usually administered by means of a Higginson's syringe, to which a vaginal tube has been attached. This tube, which should be made of hard rubber, is sold with the syringe; it is a straight tube, five or six inches long, with a number of little holes pierced in the sides of its olive-shaped nozzle. There should, however, be no central aperture at its tip, as the fluid is in danger in that case of being propelled into the cavity of the womb itself, where it might produce alarming symptoms. Previously to its introduction a quantity of warm water should be pumped through it. The proper mode of using it is as follows:—The patient lies near the edge of the bed, on her back, with a round earthenware

bed-pan underneath her to receive the returning fluid. The knees are drawn up, the nozzle of the tube, previously oiled or anointed with vaseline, is passed under the right knee and so into the vagina, the end being directed towards the upper and back part of the canal. The patient herself can hold this part of the apparatus in position, while the nurse, having placed the other end in the jug or basin which contains the fluid to be injected, and which has been conveniently arranged close to the side of the bed, gently compresses the pump of the syringe, allows it to refill, again empties it, and so on until the whole of the desired quantity has been slowly injected. In withdrawing the nozzle, its point should be kept upwards to prevent the fluid remaining in the apparatus from running out. The syringe, after being used, should be well cleansed and hung up by a loop tied round its metallic end. Almost any quantity of fluid can be injected by this method, the only limit being the size of the receptacle.

Vaginal douches or injections may be simple or medicated. For cleansing purposes, either pure tepid (70° to 85° Fahr.) or warm (85° to 100° Fahr.) water may be used, or some simple disinfectant solution—*e.g.*, Condy's fluid, in the proportion of a tea-spoonful to each pint of warm water, or solution of chlorinated soda, in the proportion of a fluid ounce to each pint. Medicated solutions are only to be used when ordered by the medical attendant, who will give all needful directions. Douches of pure hot water (100° to 110°, or even 115° Fahr.) have been recently much prescribed, especially for the relief of certain local inflammations.

Liniments require using with the utmost care, as they very frequently contain highly poisonous ingredients. They are for the purpose of being rubbed into the skin of some part of the body. To prevent the escape of any of the volatile substances which often enter into the composition of a liniment, the bottle should not be left uncorked longer than is absolutely necessary. After using a liniment, neither patient nor nurse should touch any other part of the body until the hands have been thoroughly washed, as many liniments are very irritating to the eyes and other sensitive parts.

A few of the more powerful of them, such as the liniments of iodine, aconite, and belladonna, are not to be rubbed in, but painted over the skin by means of a camel-hair brush. They are in reality paints, not liniments.

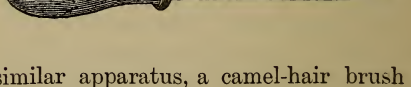
A Gargle is a wash for the mouth and throat. A table-spoonful is taken into the mouth. The patient then bends his head back for a few seconds, opens his mouth, and turns his face from side to side, so as to bring the liquid well in contact with the upper part of the throat, before allowing it to run out of the mouth again. When acid gargles have been used, the mouth should be rinsed with cold water, to prevent injury to the teeth.

By a Collyrium is generally meant an eye-lotion with which the eye may be simply bathed, allowing some of the fluid to pass within the lids, or which may be applied by means of a small glass eye-bath, or as a douche. Eye-lotions should for the most part be applied warm, and the utmost care should be taken not to use any of the appliances employed for an

inflamed eye for any other patient or any other purpose, as some forms of inflammation of the eye are readily communicated.

Eye-drops are to be introduced in such a manner as to be brought into contact with the whole surface of the eyeball. The patient's head being thrown slightly back, the operator places a finger of the left hand on the skin, just below the edge of the lower lid, and, drawing it down sufficiently far to enable him to rest the tip of his finger on the cheek-bone, he thus exposes to view the inner surface of the lower lid, on the outer end of which he, with his right hand, deposits the number of drops required, and then gently allows the lids to close. The drops are best applied by means of an eye-dropper, made by drawing out a small piece of glass-tubing to a point, and fitting it with an ordinary feeding-bottle teat of india-rubber, *unperforated* (Fig. 6). In the absence of this, or

Fig. 6.



some similar apparatus, a camel-hair brush or quill must be used.

Inunction.—A rapid and convenient method of introducing mercury into the system is by rubbing mercurial or blue ointment into the skin. The parts usually selected are, in the adult, the inner part of the upper arm, or the inner aspect of the thigh, and in the case of infants, the soles of the feet. A piece of the ointment, equal in size to a hazel-nut, or to a

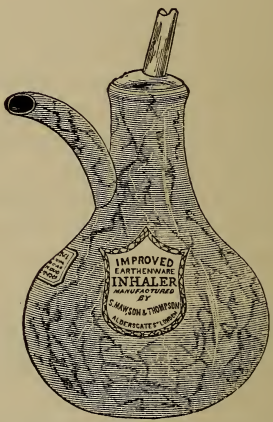
large pea if the patient be a child, is rubbed gently into the skin for three or four minutes night and morning, and a turn or two of flannel bandage then wrapped around with the purpose not only of assisting absorption by keeping the part warm, but also of preventing the clothing from being soiled and the ointment from being rubbed off. The part should be washed with soap and water before each fresh application. Should the gums become tender, or the saliva flow too freely, during the treatment by inunction, the applications should be immediately discontinued until the medical attendant has seen the patient, as otherwise salivation may be induced.

Other ointments, though used chiefly as dressings, are occasionally ordered to be rubbed into the skin in the same way as liniments, directions for the use of which have already been given.

Inhalations are used for the purpose of applying remedies directly to the lining membrane of the throat, windpipe, bronchial tubes, and air-cells of the lungs. Some consist of steam alone, or steam mixed with some medicinal vapour, taken into the lungs during the act of breathing—steam inhalations; others of medicinal solutions directed into the mouth in the finely divided form of spray, by means of an apparatus similar in principle to that so commonly used for diffusing scent—atomized inhalations; and others again, of similar solutions, generally of an antiseptic character, sprinkled on some absorbent material, which is enclosed in the body of a respirator, so that the vapour therefrom becomes evenly diffused through the air which a patient breathes—respirator inhalations.

There are many different kinds of apparatus for administering steam inhalations, each possessing certain special advantages; but a few rules may be here given which will be more or less generally applicable. *First* of all, a patient should inhale without making any effort; he should breathe through the mouth-piece of the inhaler, just as quietly as if he were breathing in the ordinary way. *Secondly*, he should not keep the mouth-piece in his mouth during the

FIG. 7.

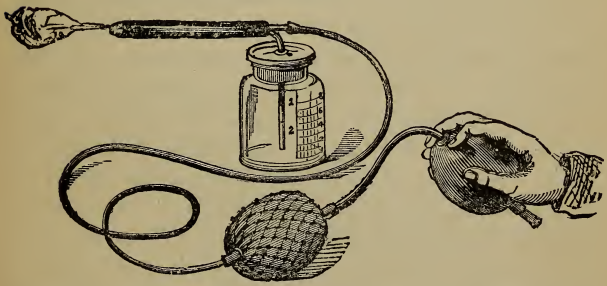


whole time, but, having breathed through it five or six times in succession, he should remove it, breathe naturally for about half a minute, and then, replacing the mouth-piece, inhale again five or six times, and so on. With this precaution, an inhalation may be continued for any length of time, from five minutes to half an hour. *Thirdly*, he should inhale before meals, and avoid going out for half an hour after

inhaling. *Fourthly*, the water poured into the inhaler should be nearly but not quite boiling; and when the medicinal solution is added, and the inhalation commenced, the temperature, as measured by the thermometer, should not exceed 150° Fahr.

When a patient is able to sit up, an ordinary earthenware inhaler (Fig. 7) will be found very simple and useful. It is fitted with a cork, secured within which is a glass mouth-piece. Springing from the side of the vessel, like the spout of a teapot, is a tube for the admission of atmospheric air. The

FIG. 8.



upper level of the hot water should not reach high enough to cover the inner opening of this tube; in other words, air should enter the inhaler above the surface of the water. Other inhalers are fitted with long flexible tubes, to which the mouth-piece is attached, enabling a patient to inhale in any position.

A spray-producer for atomized inhalations is figured in the annexed woodcut (Fig. 8). The medicated solution is poured into the graduated glass jar, and the apparatus worked by using the uncovered india-rubber bag as a hand-pump.

Antiseptic inhalation has been recently employed in various diseases of the throat, in bronchitis, and more particularly in the early stages of consumption. The inhalation is often ordered to be kept up in such cases for several hours at a time. For this purpose the various forms of apparatus already described are obviously too cumbrous, and inhalers of a much more portable and convenient form are now largely used. Amongst them are several adaptations of the ordinary respirator, the air breathed being made to pass through a little compartment containing a pledget of tow or cotton-wool which has been saturated with the antiseptic solution. The perforated lid of the compartment lifts off with a hinge, to permit the occasional renewal of the porous material and the sprinkling of it with the drug prescribed. These antiseptic inhalers are provided with elastic loops to pass over the ears, and can either be had covered, for out-door use, or plain, the latter being the more easy to wash and keep clean. From ten to twenty drops of the solution, according to the directions, are to be poured over the tow or other porous material at least twice a day, and the pledget itself requires changing about once a week.

The most suitable times for inhaling are for an hour or so before going to sleep at night, and for an equal length of time after the usual fit of coughing and expectoration in the morning. The apparatus may, however, be used at other times, either in the day-time or during the night, according to the instructions of the medical attendant, and the amount of relief experienced. Many patients of their own accord wear it almost continuously. Dr. Coghill lays much

stress on the importance of taking in the breath (inspiring) through the mouth alone, so as to draw it through the inhaler, and letting it out again (expiring) through the nose.

With the object of permitting the patient to continue his occupation whilst inhaling, Dr. I. Burney Yeo, Dr. Hunter Mackenzie, and others, have devised instruments so constructed as to cover both the mouth and nose. These so-called ori-nasal respirators, or respirator-inhalers, have the great advantage of rendering it unnecessary to adopt any particular mode of breathing; the patient may breathe through mouth or nose at will.

CHAPTER V.

Fomentations: Simple, Turpentine, Laudanum, Marshmallow, Chamomile, Poppy—Poultices: Linseed-meal, Bread, Yeast—Goulard Poultice—Mustard Plaster—Mustard Poultice—Charcoal Poultice—Warm Water Dressing—Medicated Lotions—Wet Compresses—Dry Heat—Cold Water Dressing and Evaporating Lotions—Irrigation—Local Application of Ice—Leiter's Temperature Regulators—Blisters—Croton-oil Liniment and Tartar-emetic Ointment—Leeches—Ointments.

FOMENTATIONS form a convenient and ready method of applying moist heat to a part, and are often extremely useful in affording relief to pain. In hospitals, where flannels are kept specially for this purpose, they are made double, of various sizes, and are stitched together at the ends, but not at the sides. This mode of stitching is to facilitate the wringing, which, if there does not happen to be a proper "wringer," is accomplished by means of two wooden rollers slipped between the folds of the flannel, one at each end. In home nursing, where these appliances are not available, the best plan is to lay a coarse towel in a basin, fold the flannel the size required, place it on the towel, and pour boiling water over it. Then, by

twisting the towel contrary ways, the flannel is to be wrung as dry as possible, and in order to prevent it cooling, is to be carried to the bedside in the towel. In the case of simple fomentations, all that is now necessary is to hold the flannel in the fingers of both hands, and give it one good shake, in order to admit a little air between the folds, and then to apply it as quickly as possible, covering it over with a piece of waterproof sheeting, or a double fold of warm dry flannel. A fomentation requires to be changed every quarter of an hour, a fresh one being in readiness before the other is removed.

Turpentine fomentations constitute a most valuable form of counter-irritation, and are frequently of marvellous efficacy in the rapid relief of pain. They are prepared in the same way as ordinary fomentations, with the addition of half an ounce or an ounce (a table-spoonful or two) of turpentine, according to the size of the fomentation. The turpentine is to be quickly sprinkled over the flannel, after it has been wrung dry and shaken out, and when it is just ready to be put on. The side on which the turpentine has been sprinkled is to be placed next to the skin, and the fomentation, after being applied, is to be covered over with dry, warm flannel or waterproof sheeting, and kept on for about twenty minutes, or for at least five minutes after the turpentine has begun to produce a decided effect.

Laudanum fomentations are also ordered, from time to time, for the relief of pain, having largely taken the place of the old-fashioned fomentation with decoction of poppy (see next page). The mode of their preparation and application is the same as that of tur-

pentine fomentations, an equal quantity of laudanum being substituted for the turpentine, Certain decoctions are occasionally used instead of pure hot water for fomenting purposes; such, for example, as decoction of marsh-mallow, of chamomile, and of poppy.

Decoction of Marsh-mallow is made by adding five pints of boiling water to a quarter of a pound of dried marsh-mallow root, boiling to three pints, and straining through calico.

Decoction of Chamomile is made from chamomile flowers. Take two ounces of the flowers and an ounce of fennel seed; add four pints of boiling water; boil, and strain.

Decoction of Poppy is made by adding to a quarter of a pound of white poppy-capsules, freed from seeds and bruised, three pints of boiling water, boiling for ten or fifteen minutes, and straining. The quantity of decoction resulting should measure two pints.

POULTICES are made of different materials, according to the effect required. Thus, for soothing poultices, in which heat and moisture are the great requirements, linseed-meal and bread are the materials most in use.

To make a *Linseed-meal poultice*, put a little boiling water into a basin previously rinsed with hot water, and then quickly add, little by little, a sufficient quantity of linseed-meal to make a poultice of firm consistence, stirring well the whole time. When it is mixed, spread it thickly, by means of a broad knife or spatula dipped in hot water, upon a piece of linen or cotton, or upon tow, leaving an uncovered margin to be turned in over the edge. A single layer of muslin placed over the face of the poultice prevents

detached fragments of linseed from adhering to the skin, without interfering with its efficiency. The poultice must be applied as hot as it can be comfortably borne; if the nurse can bear it held against her own face, she may, as a rule, conclude that it is not too hot to be applied to the patient. A covering of oiled silk, thin macintosh sheeting, or (what is still better) cotton wool surrounded by dry flannel, serves to preserve the heat and to prevent evaporation of the moisture. A poultice, moreover, should always be well secured in its place by suitable bandaging, so as to prevent the cold air from finding its way between it and the skin, an occurrence which quickly renders it useless and uncomfortable. In children, the chest is frequently ordered to be enveloped in a poultice, both in front and behind, in which case it should be spread upon a piece of linen cloth large enough to cover the back of the chest, and meet in front, where it should be secured by tapes in three places; tapes should also be fastened at each shoulder to prevent the poultice from slipping down. Linseed poultices require to be renewed every two, four, or six hours, the more frequently the better; the old poultice should not be removed until the new one is ready to replace it.

A *Bread poultice* is made by gradually adding coarse bread crumbs to a little boiling water, in a basin that has been previously rinsed with hot water. Stir them well, cover the basin with a plate, and let it stand in front of the fire for five minutes. Then spread and apply the poultice, renewing it in four hours.

It may be noted that brown bread is more stimu-

lating, or, as it is commonly expressed, draws better than white. In order to get rid of the alum contained in most bread, always let the first water be poured away.

Yeast poultices are used to stimulate a slowly healing wound or ulcer, and are made as follows :—A quarter of a pound of flour, or linseed-meal, is mixed with two ounces of yeast or beer-grounds ; the mixture is then heated in a pot, and constantly stirred until it is warm enough for use. The pot used must either be of earthenware, or have a white glazed lining.

Goulard poultices are made by carefully squeezing all the water out of a white-bread poultice, and adding to it as much Goulard (lead) lotion as it will absorb. This poultice requires no muslin between it and the skin. It should not be used where the skin is broken.

A MUSTARD PLASTER or SINAPISM is a safe and ready counter-irritant. It is made by mixing mustard with warm water (not boiling water, spirit, or vinegar, all of which destroy or prevent the production of the volatile oil, upon which the efficiency of the plaster at least partly depends), until it is smooth and consistent, and is applied on a piece of rag or brown paper, with or without a layer of muslin between the mustard and the skin. It should be kept on from twenty minutes to half an hour, and a proportionately shorter time in the case of children ; if it is worn a longer time than this it is in danger of raising a blister (which is not the object intended), and sometimes even produces a slough. After its removal, a piece of linen, upon which a little vaseline

has been spread, may be laid upon the skin, or the skin may be dusted with finely powdered starch (violet powder), and covered with a layer of cotton-wool.

Mustard leaves and mustard paper (*Charta sinapis*) are cleanly and efficient substitutes for a mustard plaster. They simply require to be dipped for a few seconds in water, cold in summer, and tepid in winter, applied wet, and fixed on by means of a handkerchief or bandage.

A MUSTARD POULTICE is less rapid in its action than a pure mustard plaster, and, for some purposes, is on that account preferable. It is directed, in the "British Pharmacopœia," to be made by taking equal quantities of mustard, in powder, and of linseed-meal. Mix the linseed-meal with boiling water, and add the mustard, constantly stirring. Spread the poultice on a piece of cloth or brown paper, and apply, with or without a layer of muslin between the poultice and the skin, for five or six hours, or longer if directed.

A CHARCOAL POULTICE, which, owing to the absorbent power of charcoal, is an effective application for destroying the bad smell of sloughing sores, is made thus:—Soak two ounces of bread-crumb for a few minutes in half a pint of boiling water; add to an ounce and a half of linseed-meal, a quarter of an ounce of wood charcoal; mix all these gradually together, and when the poultice is spread, sprinkle another quarter of an ounce of charcoal over it before it is applied.

WARM WATER DRESSING.—This is a most soothing and comfortable application, and constitutes the

simplest form in which warmth and moisture can be continuously applied to a part. In order that it may be effectual, the same conditions must be fulfilled as in the case of fomentations and poultices—that is, it must be so applied as to retain its warmth and moisture as long as possible. Being a warm, rather than a hot application, it is not so useful as fomentations for the immediate relief of severe pain, or so efficacious as a poultice, where pressure is desirable, or where, as in the case of an abscess, the inflammation is intense.

It is thus applied:—A piece of lint, two or more folds in thickness, is dipped into warm water, wrung out, put on so as exactly to cover the wound or inflamed part, and then covered with a piece of gutta-percha tissue, or oiled silk, which must extend a little beyond the fold of lint on all sides, to prevent the drying or cooling of the dressing. It is kept in position by various contrivances, according to the situation of the affected part: sometimes by strips of plaster, sometimes by a bandage or folded handkerchief.

The dressing needs renewal twice or three times in each twenty-four hours; where the skin is unbroken, the lint may, except at intervals, only require wetting afresh, but in the case of discharging wounds, a piece of fresh lint must be applied at each dressing.

Medicated Lotions, with the exception of evaporating lotions, are, when ordered as a dressing, to be used exactly in the same way as just directed for pure warm water.

A Wet Compress is a local adaptation of the prin-

ciple of the wet pack, and is, to a part of the body, what a wet pack is to the whole. It consists of a small towel, napkin, or piece of linen, folded, thoroughly soaked with cold water, wrung out as dry as possible, and applied to the part. It should be covered with a piece of oiled silk or dry flannel. Worn all night round the neck, this application is very effective in relieving mild cases of sore throat, and in constipation a similar application over the bowels is said to be highly useful. The compress quickly becomes warm, and the effect of the combined warmth and moisture is very soothing. On removing a wet compress, the part should be rubbed over with a cold wet cloth or sponge, and rapidly dried, so as to avoid any increased susceptibility to cold.

Dry Heat is a safe and valuable remedy for the prompt relief of pains in the bowels, stitches in the side, and some other sharp pains of a similar character. It may be applied either by means of Leiter's pliable metal tubing (see page 63), or stomach-plates or india-rubber bottles containing warm water and wrapped in a fold or two of flannel, or woollen bags half filled with salt or dry bran and made hot on a dish in the oven. If none of these be at hand, a loose oven-shelf, made hot and well enveloped in flannel, will answer the purpose.

Cold Water Dressings and Evaporating Lotions are for the purpose of the continuous application of cold to a part, the moisture in this case being only valuable on account of the cold produced by its continual evaporation. Such being the object of these applications, the lint or piece of thin linen must be dipped in cold water, wrung out, and applied in a

single layer *without* any waterproof or other covering. As soon it becomes warm or dry, the lint must be re-dipped in the water or lotion—a supply of which should be poured out and kept conveniently near the patient. By means of some lengths of worsted, the wet lint or other covering may, on the principle of the syphon, be placed in communication with a jug of cold water raised two or three feet above the level of the affected part, and so be kept continually moistened by irrigation. Or an irrigator may be used, the stop-tap being suspended, by means of the bars of a wire bed-cage, over the dressing, and being so adjusted as only to allow the water to flow drop by drop.

Local Application of Ice.—When a greater degree of cold has to be maintained, the application of ice may be necessary. For this purpose the ice must be broken up into small pieces by means of a strong pin, and put into a bladder, or, still better, into an india-rubber ice-bag, in quantity not so large as to prevent the bag being moulded as it were to the part. India-rubber ice-bags are made of various shapes for different parts of the body. Thus, there are long bags (Chapman's) with pockets at different heights, for applying ice to the spine; circular bags of three different sizes, and bags of helmet shape for the head; curved bags for the throat; oval bags for the heart and abdomen.

Another method of cooling the head is to put a lump of ice into a cup-shaped sponge, and carry this repeatedly round the head; as the ice melts and the sponge becomes saturated, the water must be squeezed out and the ice renewed.

There are certain obvious disadvantages attending all appliances of india-rubber, such as their tendency to produce irritation of the skin by preventing the escape of perspiration; their disagreeable odour; their indifferent conducting properties; and, lastly, their costliness and liability to spoil. Leiter, of Vienna, has recently introduced a method of regulating the temperature of different parts of the body, which is free from many of these objections. It consists in the use of pliable metal tubing, wound spirally into regulators of various forms and sizes, through which water of the required temperature is made to flow continuously from a supply-vessel, placed above the level of the body, into another or receiving vessel resting on the floor. The spirals are loosely connected by means of bands which permit of their being moulded to any surface, whether flat, rounded, or hollow, by simply pressing the regulator with both hands. To each regulator two flexible rubber tubes, furnished with leaden weights, are attached, of which one must be connected with the water in the upper or supply-vessel, and the other directed into the receiver. In order to set the apparatus in action, it is only necessary to establish a syphon action in the ordinary way by suction on the lower tube. Any kind of jug or large bottle can be used as supply-vessel. For receiving the water, it is advised to use a jug placed in a pail. After use, the regulator should be emptied either by suspending it and allowing the water to run out, or by blowing down one of the tubes.

When water of so low a temperature as 46° to 50° Fahr. is used, a piece of linen or flannel should be

placed between the regulator and the skin, as otherwise the cold would be unendurable. When the metal is in direct contact with the skin, water of a temperature of 60° to 68° Fahr. is generally sufficiently cold. The use of ice with these appliances is only necessary when the head is the part from which heat is to be abstracted, and the hair happens to be very thick. The weight of these regulators when in action is said to be less than that of india-rubber ice-bags covering an equal surface.

Blisters are less painful, but more depressing, than mustard plasters. They produce, however, a deeper and more lasting effect, and are, therefore, better adapted for certain kinds of inflammation.

Some medical men prefer the old-fashioned blistering or cantharides plaster; others order the part to be painted with blistering fluid. The difficulty with both is to regulate the application so as to obtain exactly the result intended. For it is not necessary in every case that a blister should be raised, a decided irritation of the skin, stopping short of the production of actual blisters, being often all that is necessary or desirable, although patients, unless forewarned, are always apt to think that the application has failed if it has not raised a blister.

In using the ordinary blister, or cantharides plaster, the effect is regulated by the length of time it is to be kept on; thus, if it is applied for three or four hours only, it will probably only redden the skin, if for six, eight, ten, or twelve hours, it will be almost certain to vesicate.

The blistering plaster should be spread on stiff brown paper or leather, either of which is preferable

to adhesive plaster, for as soon as blisters begin to rise under the plaster, the adhesive border of the latter causes so much dragging pain that the patient often complains more loudly of that than of the blister itself. A pad of cotton-wool, and a handkerchief or bandage will be generally enough to secure the plaster in its place. Its removal at the appointed time must be effected very cautiously so as not to tear off the scarf skin or cuticle. If no blisters have formed, a dressing of zinc ointment made with vaseline, or of vaseline alone, spread on a piece of lint, or old linen, and renewed night and morning for two or three days, is all that is required. If blisters have formed, they should not be opened unless they are so large that, if not emptied, their bursting is inevitable, in which case the bleb must be snipped with scissors at the lowest point, and the fluid allowed to run into a cup held to receive it, so that it may be measured, and examined, and that the clothing may not be soiled. The aim, however, should always be to allow the fluid to become re-absorbed by leaving the blisters undisturbed; for the fluid withdrawn from a blister represents a loss to the body almost as great as if it were so much blood. Whether the blisters require to be opened or not, the dressing should consist of a piece of lint covered with zinc ointment made with vaseline, and, outside this, a thick padding of cotton-wool, to lessen the risk of accidental injury, and prevent the access of air. If absorbent cotton-wool be used, it will serve the further purpose of soaking up any discharge. The application of a warm poultice will often increase the effect of a blister, and at the same time soothe the irritated skin.

When blistering fluid is used, the part should be lightly covered, immediately after the painting, with lint or cotton-wool, or with a linseed-meal poultice. If either of the two former applications be employed, it may remain undisturbed for a day or two, unless the part become uncomfortable, or the wool become soiled by a profuse discharge of serum from the rupture of a blister, when it must be removed. Subsequently, the blistered surface is to be dressed as directed after an ordinary blistering plaster.

Croton-oil Liniment and Tartar-emetic Ointment are occasionally used to produce counter-irritation, chiefly on the chest. They require to be rubbed in once or twice daily, until a crop of small pustules appears. After each rubbing, the hands should be carefully washed.

Leeches.—When leeches are about to be applied, the part should be well washed with soap and warm water, and thoroughly dried, and the leeches themselves should also be cleaned and dried between the folds of a soft cloth. They may sometimes be induced to bite by simply inverting over the skin the box or glass in which they are contained, or by placing them in the hollow of a towel or napkin folded in the form of a cone, and inverting that over the part; in either case the cover is to be held over them until they begin to bite. Or, each leech may be held separately in the fingers (which should be protected by a clean soft towel), and its head directed towards the spot where it is wished to bite. But the surest way is to apply them in their own proper element, water, which can easily be done as follows:—The leeches are put into a wineglass containing tepid water, and covered

over with paper. The glass, with its covering, is then to be inverted over the skin, the paper withdrawn, and a sponge held beneath the glass to absorb the water as it escapes. As soon as the leeches have fixed themselves, the glass may be removed.

When they have done their work, they drop off of their own accord. They should never be pulled away, as they are apt to leave their teeth imbedded in the skin, and cause inflammation.

The part should now be bathed with warm water, dried, and then covered with a little cotton-wool, unless the directions are to encourage the bleeding for a time, in which case the part must be fomented with hot flannels for half an hour, or a warm linseed poultice must be applied.

Sometimes the bleeding from leech-bites goes on too long, and becomes a source of danger from the exhaustion it produces. Hence a patient should never be left for the night, after the application of leeches, until all bleeding has ceased. To check the bleeding when it is too profuse or is continuing too long, the proper plan is to take a very small pledget of cotton-wool, or scraped lint (charpie), and press it firmly on to the bleeding spot for a few minutes with the point of the finger. Or, if it is on a part where such a method is applicable, the pledget of cotton-wool may be covered with a small compress of folded lint, and firmly secured by a few turns of bandage. Should these means not succeed, the medical attendant must be sent for, and the bleeding arrested until his arrival by the pressure of the finger.

Leeches, if not required for immediate use, may be kept in a glass or earthenware jar, covered with stiff

paper or leather, perforated. The water requires to be changed every five or six days.

As a general rule it is undesirable to use leeches more than once, even for the same patient, and they ought never to be used again for a different one. When it is necessary to preserve them, they must be made to disgorge the blood by sprinkling them with a little salt, and then be washed several times in clean cold water, before putting them aside in the manner already directed.

OINTMENTS are chiefly used in the treatment of skin diseases and as dressings for wounds. In the case of the parasitic skin diseases—that is, the diseases which are due to the presence either of an insect, as in itch, or of a fungus, as in ringworm—they require to be rubbed into the affected part. In the case of most other eruptions, they are best applied spread on the smooth side of strips of lint, which are to be laid evenly, one after another, on the affected part, until it is completely covered, and secured by a thin flannel bandage, or, if the part be the head or face, by a cap or mask. Whenever scabs and crusts form they must be removed by poulticing or the application of warm olive oil, before ointments can be expected to be of any service.

As dressings for sores or wounds, ointments must be spread by means of a spatula or knife on pieces of lint, cut of the exact size required, and retained on the part by some cross strips of plaster, or by a bandage, as may be most convenient.

CHAPTER VI.

Baths : Hot, Warm, Tepid, and Cold—Graduated Cold Bath to reduce excessively High Temperature—Hip-baths—Hot and Cold Foot-baths—Arm and Leg-baths—Hot-air and Vapour-baths—Cold Wet Pack—The Half-pack—Tepid Sponging—Massage or Rubbing.

Baths.— In preparing hot, warm, and tepid baths, a nurse must always test the temperature of the water by means of a thermometer, and not trust to her own sensations, which are apt to be very misleading. The hot water must be allowed to run into the bath first, and the cold water then added until the thermometer shows the bath to be of the required temperature. The body of the patient should, as a rule, be wholly under water, up to the neck, but in cases of croup and pneumonia, and wherever the breathing is embarrassed, or the heart weak, the water should on no account be allowed to cover the chest, lest the weight of the water pressing upon the ribs should dangerously interfere with the action of the heart and lungs.* Patients

* From want of attention to this point, the warm bath given to children at the outset of an attack of croup, instead of affording relief, often becomes an additional source of danger.

suffering from diseases of the throat or chest should, therefore, lie or be held in a slanting position in the bath, with a blanket placed carefully around them, to prevent the surface of the chest being chilled. Whatever be the temperature when the patient enters the bath, it must be kept at the same height the whole time; hence the thermometer should be used every five minutes to ascertain if the water has become cooler, and, if it has, more hot water must be added. The proper temperature for each of these baths, and the average time, that in the absence of special directions patients should remain in them, are as follows, viz.:—

For a hot bath, from	98° F.	to	105° F.,	and its duration		10 to 15	minutes.
„ warm „	„	92° F.	to 98° F.	„	„	15 to 20	„
„ tepid „	„	85° F.	to 92° F.	„	„	20 to 25	„

A *Hot bath* is liable to produce a condition of faintness, especially in the sick and weakly, and after exhausting illness. A patient may, under these circumstances, lose his muscular power and consciousness to such an extent as to involve a risk of his being drowned, so that it is never safe for a sick person to be alone while in the water. The moment a patient begins to feel faint he should leave the bath.

On leaving the bath the skin should be rapidly rubbed over with a sponge, squeezed out of cold water, or with a cold wet towel wrung out, and then well dried, the body being carefully preserved from exposure to draughts. The patient should then dress or get into bed without delay.

The effect of hot baths upon the nervous system is to stimulate and excite it, that of tepid and warm

baths to calm and soothe it; the former are therefore more useful when there is much depression, the latter when there is great nervous irritability.

The temperature of a *Cold bath* varies, of course, with the weather. It should be taken either before or three hours after breakfast, and, except under medical advice, only by the healthy. It is sometimes prescribed, with great benefit, in certain of the curable diseases of the nervous system. On entering the bath, the whole body, including the head, should be immediately plunged under the water, otherwise the head should be thoroughly wetted by means of a sponge beforehand. The period for remaining in the water depends to a certain extent upon the temperature; as a rule it should not exceed three minutes. The body should be kept in active movement during the whole time; and the subsequent drying and dressing must be performed quickly.

Cold baths are occasionally ordered in cases of fever, where the temperature of the body becomes dangerously high, to reduce the excessive heat. It is customary to begin with water at a temperature of about 90° Fahr., and gradually cool it to 68° or 70° while the patient is in the water. The bath is continued for about half an hour, or until the temperature of the patient's body (as ascertained by placing a clinical thermometer in the mouth or rectum) is decidedly lowered. Should an attack of shivering come on, the patient should be at once taken out of the water and put to bed, hot-water bottles being applied to the feet and other parts of the body, and some warm beef-tea or a little brandy and water administered. This remedy, however, of the graduated

cold bath, being a very powerful one, and by no means free from serious risk, should never be administered, except under the personal superintendence of a medical man.

Hip-baths are ordered when it is undesirable that the whole body should be immersed, or when it is specially intended to influence the organs contained within the lower part of the body. Baths are made for the special purpose; in preparing them the nurse must take care not to fill the vessel more than one-third full, lest when the patient sits down the water should overflow. The water may be either hot or warm, the former being more generally prescribed. The shoulders of the patient should be well covered, and also the knees where, as sometimes happens, the bath is not large enough for the water to cover them.

For Hot Foot-baths the water should be as warm as it can be comfortably borne, and its temperature should be kept up by adding hot water from time to time. The knees and upper part of the body should be covered with a blanket, and the feet should remain in the water from twenty to thirty minutes. When taken out they should be quickly dried, and either wrapped in flannel or have a pair of warm stockings drawn on. Where it is desirable, a foot-bath may be given while a patient is lying in bed, by turning up the bed-clothes from the foot of the bed, protecting the under-sheet by a piece of mackintosh, and placing the foot-bath in such a position that the patient can lie comfortably with the knees drawn up and the feet and legs immersed in the water. A blanket should be thrown over both knees and bath.

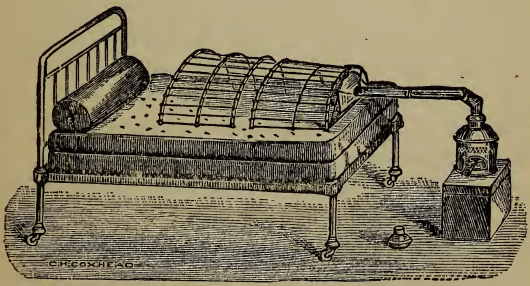
A Cold Foot-bath, in which the depth of the water

does not exceed three or four inches, is often useful in facial neuralgia, in certain forms of headache, and for coldness of the feet, occurring in persons of feeble circulation. The bath should not last longer than five minutes, and friction should be employed the whole time. The efficacy of the bath is increased by mixing some coarse mustard with the water.

Arm and Leg Baths are made of zinc, with loose covers to keep the water warm, and strips of webbing stretched across so as to form a sling, on which the limb may be suspended. These baths are useful in the treatment of certain skin diseases, rheumatic, and other joint-affections, and for cleaning injured limbs.

Hot-air Baths are best given by means of a

Fig. 9.



lamp and a body-cradle, which is a cage of wicker-work (Fig. 9) or japanned iron-ware to raise the bed-clothes, and form a chamber for the hot air. The patient is stripped and laid upon a blanket in bed, a cold wet towel being wound, turban-like, around the head. The body-cradle is then placed on the bed, with at least one large blanket thrown over it, so as

to envelop the patient from the feet to the neck, and the lamp is lighted and placed on any article of furniture which will raise it to the required height, its tube being inserted under the blanket, so that the air may enter *above the body*. The blanket and other bed-clothes are to be meanwhile carefully tucked in all around the bed and at the patient's neck. The bath may be continued for a quarter of an hour or half an hour, according to directions, and during profuse perspiration the wet towel around the head should be changed from time to time. The patient should not be left while in the bath. Where perspiration does not speedily take place, the body may be sponged with tepid water and the apparatus re-applied without drying the surface.

VAPOUR BATHS may be given by means of the same apparatus, or, in a more rough-and-ready manner, by wrapping up a heated brick in a piece of flannel, thoroughly soaked in water, or in vinegar, and placing it on an earthenware dish under the body-cradle. The use of vinegar produces an acid steam-bath which is said to give great relief in rheumatic fever. The bath may be continued for fifteen or twenty minutes, when the body must instantly be mopped all over with a cold wet towel and then thoroughly dried.

Both these baths may, in less severe cases, be given to the patient while seated on a cane-bottomed chair, beneath which is placed the spirit lamp, suitably shielded, and with or without the vaporizer, according to whether a hot-air or vapour bath is required. After the patient is seated, a large blanket must be so arranged as to surround both the patient and the chair, not hanging too closely in contact with the

body of the patient, and leaving the face and head uncovered.

The Cold Wet Pack is a valuable means of treatment in fevers, and some other acute diseases. It is accomplished as follows:—The mattress is first of all to be covered with a piece of waterproof-sheeting, and two strong binders are then to be laid across the bed, with their ends hanging over the bedside. A thick blanket is now arranged on the bed, and upon that a large linen sheet, which has been wrung as dry as possible out of cold water. The patient, stripped of all clothing, is placed upon the wet sheet, which is folded over and tucked well and evenly under the shoulders and body, so as to cover him completely from the neck downwards. The blanket is next drawn over the sheet, and tucked evenly under the patient on both sides. The nurse then passes her hand under the feet, lifts them up, and tucks back the lower ends of the sheet and blanket under the heels. The binders are now tied around the patient, and four or five blankets placed over the whole, and pressed close to the sides.

The patient should not, as a rule, remain in the pack longer than half an hour, except when a warm and soothing effect fails to be produced in that time, and even in these cases the application should never be continued for more than an hour, for fear of exhaustion. Draughts of cold water may be given from time to time to promote perspiration. On the pack being removed, the body must be quickly sponged over with tepid water, dried with a soft towel, and wrapped in a warm dry blanket for some hours. The process may be repeated, if necessary, as in some cases of fever, every three or four hours.

This mode of treatment renders the skin moist and comfortable, lessens restlessness and delirium, and diminishes fever. The patient will often, while still in the sheet, fall into a quiet sleep, from which he awakes calm and refreshed.

In cases of very high temperature, the cold wet pack is a method sometimes employed to lower the excessive heat; it should then be used without the additional blankets, and changed every quarter of an hour.

The HALF-PACK is more readily applied and less exhausting than the ordinary wet pack, and is especially useful in the case of children, who almost invariably fall asleep in it. To prepare it, two towels are folded lengthwise, dipped in cold water, and tightly wrung. The patient, stripped of clothing, lies upon a dry blanket, one of the wet towels being placed immediately beneath, and one above the body, or from the armpits to below the hips, while the arms and legs remain free from restraint. Or one towel only may be used, and simply laid across the bowels. The blanket is then quickly folded over the patient, its edges being securely and evenly tucked in; the bed-clothes are replaced, and one or two extra blankets added.

The patient should never remain in this pack longer than an hour, and when removed the body should be sponged and dried in the same manner as after the ordinary wet pack.

TEPID SPONGING gives great comfort and relief in very many forms of illness, and especially in fevers. It is most effectually and easily accomplished in the following way:—A piece of macintosh sheeting

having been placed over the mattress or bedding, a warm blanket is spread out underneath the patient. The clothing is then removed from the whole body, and the entire surface quickly sponged over (passing the sponge always from above downwards) with tepid water, to which a little toilet-vinegar or aromatic-vinegar may be added. After the sponging the sides of the under blanket should be quickly folded over the still wet skin, the bed-clothes replaced, and the patient allowed to remain undisturbed, except for the taking of nourishment, for half an hour or even an hour, when the night-dress can be put on and the bed arranged as usual.

Massage, or Rubbing, is one of the oldest and most valuable methods of treatment, and though for the most part undertaken by professional rubbers, it occasionally becomes one of the duties of a sick nurse, and therefore should always form part of her practical training. It consists essentially in pinching the skin and kneading the muscles of the whole body in a systematic manner, and its uses are to strengthen the muscles, and to stimulate the action of the skin and the various internal organs, especially those concerned in digestion, the stomach, liver, and bowels. In a modified form, it is also frequently prescribed for the purpose of promoting the absorption of inflammatory and other exudations.

For the convenience of those who may not have had the advantage of receiving practical instruction, and to refresh the memory of those who have, the process recommended by Dr. Weir Mitchell, in cases of nerve-prostration, will be now briefly described in Dr. Mitchell's own words.

"An hour is chosen midway between two meals, and, the patient lying in bed, the manipulator starts at the feet and gently, but firmly pinches up the skin, rolling it lightly between the fingers, and going carefully over the whole foot; then the toes are bent and moved about in every direction, and next with the thumbs and fingers, the little muscles of the foot are kneaded and pinched more largely, and the interosseous groups worked at with the finger-tips between the bones. At last the whole tissues of the foot are seized with both hands, and somewhat firmly rolled about. Next the ankles are dealt with in like fashion, all the crevices between the articulatory bones being sought out and kneaded, while the joint is put in every possible position. The leg is next treated, first by surface-pinching, and then by deeper grasping of the areolar tissue, and last by industrious and deeper pinching of the large muscular masses, which for this purpose are put in a position of the utmost relaxation. The grasp of the muscles is momentary, and for the large muscles of the calf and thigh both hands act, the one contracting as the other loosens its grip. In treating the firm muscles in front of the leg, the fingers are made to roll the muscle under the cushions of the finger-tips. At brief intervals the manipulator seizes the limb in both hands, and lightly runs the grasp upwards, so as to favour the flow of venous blood-currents, and then returns to the kneading of the muscles.

"The same process is carried on in every part of the body, and especial care is given to the muscles of the loins and spine, while usually the face is not touched. The belly is first treated by pinching the

skin, then by deeply grasping and rolling the muscular walls in the hands, and at last the whole belly is kneaded with the heel of the hand in a succession of rapid, deep movements, passing around in the direction of the colon.

"It depends very much on the strength, endurance, and practice of the manipulator how much good is done by these manœuvres. At first, or for a few sittings, they are to be very gentle, but by degrees they may be made more rough—without hurting the patient.

"The early treatment should last half an hour, and should be increased by degrees to one hour, after which should follow an hour of absolute repose.

"After the first few days, I like the rubber to keep the part constantly lubricated with vaseline or other good lubricant, so as to make the skin smooth and supple.

"As soon as a part has been manipulated, it should be at once wrapped up."

"When the patient becomes used to the process, the operator is sometimes directed to strike the muscular masses with the soft cushion formed by the muscles on the ulnar side of the closed hand, or with the same part kept in rigid extension. The blow, if given adroitly, causes a momentary contraction of the muscle thus struck."

"The daily massage is kept up through at least six weeks, and then, if everything seems to me to be going along well, I direct the rubber to spend half of the hour in exercising the limbs—after the Swedish plan, by making movements of flexion and extension, which the patient is taught to resist.

"At the seventh week the treatment is used on alternate days, and is commonly laid aside when the patient gets up and begins to move about."*

* Mitchell (S. Weir, M.D.), "Fat and Blood, and How to Make Them." First English, from the Second American, Edition. London, 1878. Pp. 54 *et seq.*

CHAPTER VII.

The immediate Treatment of certain cases of Emergency: Fainting Fits — Epilepsy — Apoplexy — Drunkenness — Sunstroke — Hysteria — Delirium. The Arrest of Bleeding: Circulation of the Blood — Arterial, Venous, and Capillary Hæmorrhage — Bleeding from a Wound, from a Varicose Vein, from the Nose, from the Gums, after Operations, from the Lungs and Stomach. Burns and Scalds.

Fainting Fits may generally be distinguished by the patient sinking down pale and prostrate, by his becoming more or less unconscious, and by the absence of struggling or convulsions. They occur in persons of both sexes, and of all ages, and are usually the result of being in heated or overcrowded rooms, of over-fatigue during hot weather, of assuming the upright posture after severe illness, or of the loss of a considerable quantity of blood.

The first thing to be done with fainting persons, if the attack be due to the first of the causes just mentioned, is to remove them from the over-heated or crowded apartment to a place where the air is cool and fresh. Whatever the cause of the fainting, it is most important to let the person lie down, with the head low, on a bed or couch, if it be at hand, and if

not, on the floor itself. After attending to the posture of the patient, and loosening the clothes about the neck and chest, cold water may be sprinkled on the face, and a bottle of smelling-salts held under the nose for a few seconds, but not longer. No crowding should be allowed around a fainting person; the freer the access of fresh air, the sooner will the attack be over. If the patient be indoors, the window should be thrown open to admit the cool air from without. When the attack is passing off, and the power of swallowing has returned, a draught of water will be very grateful. It is useless, however, to follow the common custom of pouring a draught of cold water into the mouth, while the patient is unconscious. When the attack is so prolonged as to cause alarm, a doctor should be sent for, and in the meantime a tea-spoonful or two of brandy, or a tea-spoonful of sal volatile, mixed with a table-spoonful of cold water, may be given by means of a tea-spoon.

To prevent fainting, the patient should sit down and hold his head well forward between the knees.

EPILEPTIC FITS are usually met with in persons who suffer from them habitually, and are for the most part due to constitutional causes. The patient frequently falls down with a scream, though in some cases no sound is heard. The fits are characterized by jerking movements of the limbs, twitching of the muscles of the face, frothing at the mouth, and sudden loss of consciousness. Sometimes the face is at first pale, and afterwards flushed.

Patients suffering from epileptic convulsions should be allowed to lie down on the back, with the head slightly raised. They should have plenty of air, and

all tight clothing about the throat and chest should be loosened. In severe cases it is well to place a cork or other similar substance between the teeth to prevent the tongue from being bitten, and to use just a sufficient amount of restraint to prevent the individual from injuring himself. In doing this, no pressure must be made on the chest, and care must be taken not to stand opposite the feet for fear of injury from a kick. The legs will be best secured by two persons taking each a leg, grasping it above the knee and above the ankle, and pressing it firmly downwards to the ground. The arms, to be held properly, also require two persons, each grasping a hand and the point of the shoulder. If the movements of the head are excessive, it should be held firmly between the two hands.

As a rule, epileptic persons remain unconscious for a short time after the convulsions have ceased, and then awake with a look of bewilderment. Some, however, fall into a profound sleep, in which they may remain for several hours. Now and then the mind remains for a time so disordered that it is necessary for a strict watch to be kept, lest the patient commit some foolish or rash action. This condition of things is, however, fortunately exceptional, and is more frequently observed after the milder forms of epileptic seizure than after the severer convulsive form.

Apoplectic Fits usually occur after the middle period of life, and are seldom attended with convulsions. The patient falls and becomes more or less unconscious; in severe cases, insensibility comes on immediately. The face becomes red, and the breath-

ing loud and snorting. The condition for which apoplexy is most liable to be mistaken is drunkenness, especially if the breath of the apoplectic patient happen to smell of stimulants. Indeed, in some cases, it is impossible at first to form an opinion, hence the scandals that arise from time to time from apoplectic patients, found in the street, being taken to the police-station on a charge of drunkenness. Considering that medical men themselves are not always able to distinguish the one from the other, great allowance should be made for the police when they make a mistake of this kind.

Persons suffering from an attack of apoplexy should lie down with the head and chest raised. The clothes about the neck should be loosened, plenty of fresh air admitted, and cold water cloths or ice-bags applied to the head. No stimulants should be given, unless ordered by the medical attendant, who, it is scarcely necessary to say, should be summoned at the outset of the attack.

DRUNKENNESS does not produce insensibility suddenly, and is seldom attended with convulsions. The helplessness, moreover, comes on gradually. The breath smells of drink, and there is generally other evidence of drink having been taken to excess.

Patients suffering from a fit of intoxication should lie, not on the back or face, but on the side, with the head slightly raised. Everything tight about the neck and chest must be loosened. If vomiting does not take place naturally, it may be induced by tickling the throat with a feather; or, if the symptoms be alarming, and the patient is able to swallow, a mustard

emetic may be administered, followed by draughts of lukewarm water.

Persons who are deeply intoxicated, or who are recovering from a fit of drunkenness, should not be exposed to cold; they should be put into bed as soon as possible, and warmth applied to the feet.

SUNSTROKE, or more correctly heat-stroke, occurs after excessive fatigue, as a result of breathing foul air, and in certain conditions of health during very hot weather, especially in climates like that of many parts of India. The symptoms usually set in suddenly, the person falling down insensible while at work, while walking along the road, or even while seated indoors. The face is pale, the breathing quick and of a loud snoring character; occasionally convulsions are observed.

The proper treatment is, first, to remove the patient into the shade, and then to remove all the clothing from the neck and chest, and douche the head and neck with cold water. If a proper douche be not at hand, a garden-hose will answer the purpose, or an ordinary watering-can; failing these, the water must be poured from a jug or sprinkled on with the hands. In the meantime, admit fresh air freely, let there be no crowding around the patient; and beware of giving stimulants.

HYSTERIA.*—Fits of hysteria are sometimes so like true epileptic attacks, that it is difficult for an inexperienced person to distinguish them. Where there is any doubt, the safest rule is to deal with the

* Hysteria takes innumerable forms, but reference is here made to those attacks which are known as hysterical fits.

case as if it were one of epilepsy, until the arrival of the medical attendant. Generally, however, hysterical attacks may be recognized by the emotional disorder shown in the laughing and crying by turns, by the voluntary character of the movements, so different from the uncontrollable muscular spasms of epilepsy, by the absence of *complete* helplessness and insensibility, by the fact that hysterical patients seldom fall, and that when they do they take good care not to hurt themselves, by the absence of foaming at the mouth and biting of the tongue, and, lastly, by the sex of the patient, and generally by her youth.

The great point in the treatment of hysterical attacks is to avoid exhibiting the least alarm, fussy attentions only serving to prolong them. Anxious and inexperienced friends are always desirous that active measures of some kind should be taken. The nurse must endeavour to allay their fears, assuring them that quietness is necessary for the patient's speedy recovery. She may then request that she and the patient be left to themselves, and when they are alone she may, with advantage, intimate to the patient that she understands the nature of the attack, and will sit quietly by until it has passed off. When thus deprived of sympathetic spectators, it is astonishing how soon the patient will calm down, without any unkind or rough treatment. A tea-spoonful of sal volatile may be given in half a wine-glassful of water, but no other stimulant. It is sometimes recommended to dash cold water on the face; this should never be done, however, except by special direction of the medical attendant.

After an attack of hysteria, patients very often pass a large quantity of very pale urine, an occurrence which need not occasion any anxiety.

Delirium.—Attendance upon delirious patients requires the greatest watchfulness, patience, and tact. A nurse will do wisely to humour them as much as possible, listening quietly to what they say, and above all things avoiding contradiction. Sleep is the great remedy for undue mental excitement; but it is often most difficult to secure. Much may be done, however, by surrounding the patient with conditions that favour repose. Thus, in a private house, the room should be cleared of all its occupants except patient and nurse, light should be as far as possible excluded, by pulling down the blinds and drawing the window curtains if it be daytime, and by lowering the gas if it be night, and the nurse should sit quietly by the bedside, talking and moving about as little as possible, and avoiding all appearance of excitement or anxiety. An ice-bag applied to the head is often of great use, also sponging the body with vinegar and warm water. Sleeping-draughts are never to be given unless ordered by the medical attendant.

Delirious patients are very cunning, and watch their opportunity to get into mischief. Hence the most unwearied vigilance is needed on the part of the nurse. The windows should be fitted with stays, so that patients cannot raise the sash sufficiently to jump out, and all razors, knives, and fire-irons should be put out of reach.

When the delirium assumes a violent form, mechanical restraint may be necessary, and, when it is, it must be applied effectually, or it will irritate instead

of soothing. The means usually employed are the strait-jacket and the restraining-sheet. The jacket is a sort of pinafore, made of canvas, and opening at the back, where it is tied with tapes. The sleeves are made long enough to reach beyond the ends of the fingers; they are drawn tight by tapes which run through the hem, and are further secured by bandaging the wrists. When these have been fastened, the patient is laid down, and, his arms being crossed, each hand is tied to the opposite side of the bed by means of the tapes at the end of the sleeves. The knees must then be prevented from being drawn up by passing a folded sheet across the ankles, and fastening the ends to the side of the bed. Lastly, after re-arranging the bed-clothes over the patient, the restraining-sheet is laid over the whole, and fastened by straps and buckles at each of its ends to the bars of the bedstead, care being taken that the chest is not pressed upon so as to interfere with breathing.*

THE ARREST OF BLEEDING.—The *circulation of the blood* is carried on by means of the heart and the blood-vessels. With every beat of the heart a supply of pure blood is pumped from the left side of the heart into the arteries, and by them is conveyed to every part of the body. The arterial system has often been likened to a tree, the main artery of the body (the aorta) being represented by the trunk, and the smaller arteries by the branches. The blood that

* Where a strait-jacket is not at hand, packing the patient in a dry sheet, after the manner of a wet pack, answers the purpose admirably.

is propelled along the arteries is bright red in colour, and contains the materials necessary for the nourishment and building-up of the various tissues of which the body is composed. From the smallest arterial branches the blood passes into a still smaller set of blood-vessels, which can only be seen by means of the microscope; these vessels are called the capillaries, and it is in them that the blood parts with its nutritive elements, and takes up in their stead the waste materials that are being continually produced by the wear and tear of the tissues. On leaving the capillaries, the blood, which has now become impure and much darker in colour, passes into the veins, and is conveyed by them to the right side of the heart. The venous system may, like the arterial system, be also compared to a tree, of which the smallest branches represent the small veins that receive the blood from the capillaries, while the trunk represents the large veins which open into the heart. Thus it will be seen that, whereas in the arteries the blood flows from the larger branches into the smaller ones, the blood in the veins flows from the smaller into the larger; the current in the former being *from* the heart, in the latter *towards* it. The impure blood has now been traced to the right side of the heart; before passing from the right to the left side it has to be purified. This purification takes place in the lungs. The blood is pumped from the right side of the heart, in its dark and impure state, along a large blood-vessel, into the lungs, is there purified by being brought into contact with the air taken into the lungs during the act of breathing, and is then carried back from the lungs to the left side of the heart,

altered in colour as well as in quality, and in a fit state for distribution to the body through the arteries.

Bleeding may take place from any of the blood-vessels above described, when they give way or are wounded, varying in its amount, in its character, and in its danger, according to the kind of vessel and its size. When an *artery* is divided, the blood is of a bright-red colour, and flows in jets and with considerable force. Bleeding from an artery, or arterial hæmorrhage, is the most dangerous of all; if the vessel be a large one, such as the main artery of the thigh, life will be destroyed in a few minutes should the bleeding go on unchecked.

When a *vein* is wounded, the blood is of a dark-red colour, and flows in a slow continuous stream from that side of the wound which is further from the heart. Bleeding from a vein, or venous hæmorrhage, is easier to stop and less dangerous than arterial hæmorrhage.

When the *capillaries* give way, the blood is of an intermediate shade, and oozes from the tissues through which the capillaries run. This form of hæmorrhage only becomes dangerous when, as in bleeding from the nose, for example, a large number of capillaries give way at the same time.

Bleeding from a Wound.—The chief means by which bleeding from a wound may be arrested, until the arrival of a medical man, are cold, pressure, and elevation.

When the bleeding consists merely of general oozing, squeezing cold water over the wound from a sponge will usually cause contraction of the vessels

and stop the bleeding. Should this not succeed, pressure by means of a pad of dry lint placed over the wound and secured by a few turns of bandage will generally answer the purpose.

When the bleeding is more profuse, and is dark in colour, it is probable that it proceeds from a divided *vein*. The patient must in that case lie down, and, if the wound be in the arm or leg, the limb must be raised above the level of the rest of the body, and all tight clothing, or other source of constriction between the wound and the heart, must be removed.

Should the bleeding still continue, the wound is not to be covered indiscriminately with a number of cloths or handkerchiefs (beneath which the bleeding, though hidden from view, is still liable to go on), but pieces of dry lint or old linen must be pressed into the wound, and over these a larger pad of lint must be laid, the whole being secured by a few turns of bandage firmly applied, or tied on by a handkerchief. It is always advisable to bandage the limb below the wound, otherwise it will become swollen.

When the blood spouts in a bright jet from an *artery*, the bleeding point must be sought for (all clots of blood in the wound being cleared away for the purpose), and the end of the finger or thumb be placed over it, assisted, if necessary, by the fingers and thumb of the other hand. Medical assistance must be sought without delay, in order that permanent means of restraining the hæmorrhage may be adopted. If the thumb and fingers become too tired to keep up the necessary amount of pressure, a compress must be applied. A piece of lint, carbolized jute, or antiseptic gauze or wool, must be folded so as to form

a pad, slipped under the thumb, and pressed against the bleeding point; another pad, rather larger than the first, may be placed over it, and secured by a bandage.

There is yet another means of temporarily checking severe arterial hæmorrhage, more particularly when it occurs in the arm or leg—namely, by stopping the flow of blood higher up in the artery, that is, before it reaches the wound. For this purpose, a rolled-up bandage or other pad having been placed over the vessel, if it can be felt pulsating, a folded handkerchief or triangular bandage is passed around the limb over the pad, and securely knotted; a stick or short ruler is then passed in between the handkerchief and the limb, and twisted up tightly. (It is not uncommon to find the bleeding from a superficial wound increased by the application of a ligature of insufficient tightness.) By this means sufficient pressure can be brought to bear to stop all arterial bleeding; though some oozing of dark blood may continue to take place, owing to the obstruction which the tight band offers to the return of blood from the veins. Or compression of the limb above the wound may be still more surely and easily effected by means of Esmarch's elastic tube, with a hook at each end, or by an elastic bandage. The skin having been protected by means of folds of lint or a handkerchief underneath it. This method does not presuppose, as when a pad is used, a knowledge of the position of the arteries. To apply the tube, "let the limb be held up as high as possible, then stretch the tube to the full; wind it while stretched round and round the bare limb, and fasten the hooks at the ends to each other.

When the leg or foot is injured, the tube must be applied just above the knee; if the knee or thigh be wounded, it must be placed higher up on the thigh. If the hand or wrist be wounded, put on the tube below the elbow; if blood come from the elbow or arm, then put on the tube higher up, near the shoulder." Should the application of the tube not control the bleeding, it is because it is not put on tightly enough; it must therefore be removed and re-applied.

In whichever way the bleeding has been checked, the limb should be elevated, if the patient be in bed, on pillows, and if not, by means of cushions if it be the leg that is injured, and a sling if it be the arm. The sling, in such a case, should be so arranged that the tips of the fingers point to and touch the opposite shoulder.

All tightly fitting garments, especially those about the upper part of the wounded limb, must be loosened.

Bleeding from a Varicose Vein.—An enlarged condition of the veins of the leg is a very common complaint, especially in women who are obliged to stand much, and occasionally one of the swollen veins bursts, allowing the dark venous blood to spurt out in an alarming manner. This occurs most frequently in women with neglected ulcers of the leg, generally when the patient is going about, and the first indication may be the fainting of the patient. When such an occurrence takes place, the finger must be pressed firmly upon the bleeding spot, until a small pad of lint or linen or carbolized wool is got ready. This little pad is then to be slipped under the finger, a halfpenny or other small hard substance having been enclosed

in its folds so as to make it firmer. Another somewhat larger pad is to be placed over this, and the whole kept in position by means of a handkerchief or bandage. The patient must be kept lying down, and the leg elevated on pillows.

BLEEDING FROM THE NOSE, OR EPISTAXIS.—Persons who bleed from the nose usually hold their heads over a basin, which is the worst possible position. The head should be held back, and some cotton-wool, a sponge, or a handkerchief, pressed to the nostrils. The simple plan of holding up the patient's arms by the side of the head for a few minutes will sometimes be sufficient to arrest the bleeding. When it does not speedily stop, a doctor should be sent for, as it may be necessary to plug the nostrils. In the meantime cold-water cloths should be applied to the forehead and back of the neck. If a douche apparatus (Fig. 5, p. 44) be at hand, the patient should lean over a basin with his mouth open, and a stream of iced, or very cold, salt and water * (in the proportion of an ounce to a pint) should be directed up the nostril. The force of the current can be regulated by the height at which the apparatus is placed.

BLEEDING FROM THE GUMS, &c.—After the application of a leech to the gums, it not unfrequently happens that the bleeding is troublesome; this may readily be controlled until the arrival of medical assistance by pressing a very small pledget of lint on the bleeding spot by means of the finger. To stop bleeding from the socket from which a tooth has been extracted, the best application is a little piece of burnt

* *Pure* water is very painful when applied to the interior of the nose.

alum pressed firmly down into the cavity, which may then be filled by packing a small pledget of lint or wool over the alum. Should the bleeding continue, the process must be repeated, and if this again fails a doctor must be summoned.

BLEEDING AFTER OPERATIONS.—One of the duties which a nurse is called upon to perform is that of watching for bleeding after surgical operations. And, although in the present age of antiseptic surgery it is not a common accident, she must be prepared for its occurrence, for the life of the patient often depends on her early recognition of it. The most severe bleeding is that which comes on about ten days after operation, and it is well for the nurse to have the position of the point in the course of the artery to which pressure may be applied, already marked with ink. In all cases of serious operation on the limbs, Esmarch's band should be within reach, and applied as soon as possible if the bleeding is severe. In order that the dressings over the wound may be easily observed, the limb should not be covered with the bed-clothes, or if the wound is elsewhere, the nurse should look at the dressings from time to time, especially at the more dependent parts. Sudden faintness, pallor, and restlessness, or a fall in the temperature should be looked upon as indications for increased watchfulness; and the patient should not, under these circumstances, be left for a moment.

BLEEDING FROM THE LUNGS AND FROM THE STOMACH. —Bleeding from the lungs, or hæmoptysis, is generally accompanied with a cough; sometimes the blood simply wells up into the mouth. In either case blood from the lungs is bright red, and more or less frothy

from admixture with air, and does not contain particles of food. Bleeding from the stomach, or hæmatemesis, on the other hand, takes place by an act of vomiting, and is usually very profuse. The blood is almost always dark in colour, sometimes nearly black. Frequently, it resembles coffee-grounds, and it may be mixed either with portions of food or with mucus. If there be any doubt, an inspection of the next evacuation from the bowels will in all probability remove it, as, in cases of bleeding from the stomach, some blood almost invariably passes by the bowel and appears in the stools as a dark, almost black, substance of the consistence of tar. It should be borne in mind that blood vomited from the stomach may not come from the lining membrane of the stomach itself, but may have been originally poured out from the mucous membrane of the nose, and, having passed backwards into the throat, may thus have been swallowed. The nose and throat should, therefore, always be examined in cases of vomiting of blood.

When the hæmorrhage is considerable, the temporary measures to be adopted are practically the same whether the blood comes from the lungs or the stomach. The patient must at once lie down in a cool and quiet chamber with the head raised, and be kept absolutely at rest both in body and mind. He must not move any part of his body unnecessarily, even in bed; and he must not converse or transact any business. He must, especially after vomiting blood, take no solid food, and the liquids that he takes must be nearly cold and given to him in small quantities. Small pieces of ice should in either case be given to the patient to suck, and cloths, wrung out of very

cold or iced water, may be applied one after another as they become warm, to the chest in cases of hæmoptysis, and to the pit of the stomach in cases of hæmatemesis.

BURNS AND SCALDS.—In all cases of severe burn and scald, the nervous shock is very great, and the vital powers are seriously depressed. This condition manifests itself in the pale and pinched appearance of the face, the cold clammy skin, the weak voice, and the failing pulse. Where these symptoms are present, they require the first attention, as they indicate immediate danger to life. There can be no doubt that by far the best means at our command for relieving them is prompt immersion in a warm bath, which not only restores warmth to the surface and improves the pulse, but also quickly alleviates the pain, and at the same time cleanses the charred or scalded surface. When the warm bath is not available, the patient must be put to bed and covered with a warm blanket, while hot-water bottles are applied to the feet, under the arms, and between the thighs, and a draught of hot beef-tea or hot tea is administered, or, if the collapse is extreme, a little brandy and hot water.

With regard to the dressing of burns and scalds, after the symptoms of shock have subsided, or where the accident has not been severe enough to produce shock, almost every hospital has its own favourite method. The objects to be aimed at are to prevent the access of air, to relieve pain, and to choose a dressing which will not require frequent renewal, or occasion severe suffering during its removal.

Of all applications, the flexile collodion of the

British Pharmacopœia, painted over the injured surface by means of a large soft brush, answers the purpose best. It is a compound of collodion, Canada balsam, and castor oil, and should be painted on a second or third time, as it dries. In the case of superficial burns, the healing process will probably be complete before the scab falls off; if not, a healthy wound will be left, for which carbolized zinc or lead ointment made with vaseline, and spread on broad strips of lint, or sometimes simple water dressing, is the best application. In dressing burns and scalds, one limb or portion of the body must be dealt with at a time, the other parts of the body remaining covered. Where the scarf-skin has been raised and blisters formed, the treatment must vary according to the size of the blisters. If they are not very large, they must remain uncut, and be protected by a pad of cotton wool, in order that the serum, or fluid of the blister, may, if possible, be absorbed. If, on the other hand, they are so large or extensive that absorption of their contents cannot reasonably be expected, the scarf-skin should be snipped before the collodion is painted on, and the serum allowed to trickle into a basin, the emptying of the vesicle being facilitated by gentle pressure with a pledget of cotton-wool.

If flexile collodion be not at hand, the burnt parts should be covered with lint soaked in carbolic oil, or in a solution of an ounce of boro-glyceride in a pint of water; or freely dusted with wheat flour, and then enfolded in a very thick layer of cotton-wool, kept on by a flannel bandage. The first dressings should not be removed until they become uneasy or offensive, which will most likely not be for some days. On their

removal, any sloughs or crusts not yet separated may be removed by poultices, and as soon as the surface of the wound looks clean, carbolized zinc or lead ointment may be applied on strips of lint as directed above, and renewed daily, or, if the discharge be slight, less frequently.*

Under the most favourable circumstances the renewal of dressings in cases of burn or scald is an unpleasant and generally very painful proceeding, so much so, indeed, that it is not uncommon for surgeons to administer an anæsthetic.

Extensive burns and scalds are exceedingly apt to leave disfiguring scars, and contractions of the skin, and although these may occur in spite of every care, the position of the limbs and burnt parts should be watched during the healing with a view to preventing such deformities.

* Perhaps the most popular application for burns is Carron oil, a mixture of equal parts of linseed oil and lime-water, which, applied thickly on lint or cotton-wool, is a useful and efficient dressing. It is an unpleasant application, however, and may with advantage be superseded by one of the foregoing.

Amongst favourite remedies may also be mentioned a solution of carbonate of soda, and, for small burns, ordinary whitening.

CHAPTER VIII.

Observation of the Sick—Rigors—Sleep—Pain—Posture—Countenance—Skin—Bed-sores—Mental State—Respiration—Cough and Expectoration—Appetite—Vomiting—State of Bladder—Examination of the Urine—Bowels—Warning against the use of Purgatives in certain Bowel-affections—Danger of Erect Posture after Acute Illness—Importance of lying down in Diarrhœa—Pulse—Clinical Thermometer.

As the medical attendant can seldom remain very long with a patient, he is dependent for his knowledge of the symptoms to a great extent upon the nurse's report; hence it is of the utmost importance that she should know what to observe, and how to observe accurately.

At the outset, let it be clearly understood that a doctor wants from a nurse not opinions but facts. If she tells him, for example, that the patient is a little better or a little worse, she merely gives her opinion and in all probability leaves the medical attendant not really wiser than he was before; whereas, if she tells him how long and in what manner the patient slept, what food he has been able to take, whether the medicine has had the desired effect, and so on, she puts him in possession of important facts.

Rigors are amongst the most important of all symptoms for a nurse to note. They are attacks of shivering, and vary in degree, from a mere sensation of chilliness down the spine to a violent fit of shuddering involving the whole body, often accompanied with chattering of the teeth, and, in the more severe cases, with vibration of the bed itself, so as closely to simulate an attack of ague. They vary as much in their duration as they do in intensity, some lasting but a few seconds, others ten, fifteen, or even thirty minutes.

Their value as symptoms is due to the fact that most fevers and acute inflammations commence with a rigor, and that, speaking generally, the intensity and duration of the rigor are the measure of the severity of the coming illness. When they occur in the course of an illness, instead of at the beginning, they are still very often of the greatest significance, for then they often mean that suppuration is commencing in the suffering part. It is important for the nurse to be aware that these paroxysms of shuddering are not necessarily a sign that the patient is really cold: they are phenomena connected with the nervous system, and are often associated with a temperature considerably higher than natural.

In reporting rigors, then, the time of their occurrence, their number, their degree of severity, the length of time they lasted, and the temperature are the points to be noted.

Sleep is another matter of which minute particulars should be given: thus, besides noting the hour of falling asleep and of awaking, the character of the sleep should be described, whether quiet or restless,

whether the breathing was peaceful or noisy, whether the patient was easily awoke or slept heavily, and whether there was any talking in the sleep or other sign of mental excitement.

Pain.—The occurrence of pain should always be noted down and reported, with particulars as to the time of its coming on, its duration, whether it is constant or only occasional, its locality—*i.e.*, the part in which it is felt, and lastly its character and degree of intensity. In describing sleep a nurse gives an account of what she has herself observed; but in describing pain, she is dependent on what she is told by the patient, she cannot observe it for herself. The nature of the pain differs according to its cause and the particular structure involved; thus, it may be of a stabbing, tearing, aching, shooting, or throbbing character. These are the words which patients themselves generally employ; and it is well for the nurse in describing pain to repeat exactly what the patient says.

Posture.—Any change in position which is made spontaneously by a patient should be mentioned in the nurse's notes. As examples of the kind of information which may sometimes be gathered from such an occurrence may be mentioned the following—viz., (1) in the course of many fevers, when a patient has been for some days persistently lying on the back, and all at once turns over on to his side, there is often good ground for regarding it as the first sign of improvement; again (2) after an attack of asthma, or difficulty of breathing from whatever cause, there is no surer sign of the distress being relieved, than for a patient who has been sitting up, struggling for

breath, to lie down and compose himself for sleep; and (3) to take an illustration of a different kind, the fact of a patient persistently lying on the back *with the knees drawn up*, to relieve pain in the bowels, leads strongly to the suspicion that the pain is due to inflammation of the covering of the bowels, or, in medical language, to peritonitis.

In many cases of acute illness the horizontal or lying-down position is strictly enjoined, leave not even being granted to sit up in bed when partaking of food, or to leave the bed for the purpose of passing urine or using the commode. Acute rheumatism may be taken as an example. In the first place, all movement of the joints causes severe pain in acute rheumatism. This, however, is not the principal reason for the precaution. One of the special dangers connected with the complaint arises from the liability of the heart to become affected, and when this untoward event happens, as it does in a very considerable number of cases, there is an alarming tendency to sudden death, which the least attempt to assume the sitting or standing posture at once increases.*

Countenance.—It is scarcely necessary to say that any marked change in the colour of the face, such, for example, as sudden paleness of the cheeks and lips, or blueness, should find a place in the nurse's notes; the former change signifying a tendency to faintness, the latter some impediment to the breath-

* Pneumonia affords another illustration of the same danger, which will be again alluded to in the section on the state of the bowels.

ing. Similarly, any change in the expression is always to be reported—a pinched and anxious look is often the forerunner of serious mischief, and a sudden loss of all expression, betraying an apathy and lack of interest in what is going on, is not unfrequently a symptom of very evil omen. Flushings of the face, round patches of colour appearing and disappearing in one or both cheeks, and many other like symptoms come also within this category.

Skin.—The state of the skin is often a valuable indication to a medical attendant, and the nurse should always mention anything unusual about it. Amongst the conditions which should be observed are the temperature, the relative dryness or moisture, the colour, the presence of any rash, of unnatural sensations, and of swellings. The mode of ascertaining the temperature by means of a thermometer will be described in another paragraph, but there is a heat of skin which is so peculiarly dry and pungent as almost to convey to any one touching it a sense of being scorched, and this condition has been shown by long experience to be specially associated with acute inflammation of the lungs, or pneumonia. A temperature even higher, provided it be associated with a certain amount of moisture, does not convey to the hand any such burning sensation.

We have in acute rheumatism, or rheumatic fever as it is often called, an instance of the value of noting the amount and character of the perspiration. Many acute illnesses are accompanied, during the first two or three days, with severe joint pains, and it may for a time be doubtful whether they merely form part of a general feverish condition, or are really rheumatic,

In which case the occurrence of a profuse sour-smelling perspiration, so characteristic of acute rheumatism, at once sets the question at rest.

On the other hand, a peculiarly harsh dry skin is also characteristic of special diseases.

Any marked alteration of the colour of the skin should be noted, such as general yellowness, indicative of jaundice, or dark brown patches in various parts, which may be significant of Addison's disease. The importance of observing the colour of the face—its pallor or lividity—has already been alluded to.

The nurse should at once report any rash she may notice; for, while it may be unimportant, it may, on the other hand, give the key to the nature of the illness, as in the case of the eruptive fevers, scarlet fever, measles, smallpox, chicken-pox, typhus, &c. Similarly, severe neuralgic pain in the side, which may have given rise to a suspicion of the existence of pleurisy, may be all at once explained by the appearance over the seat of pain of the eruption known as herpes zoster, or shingles.

Amongst unnatural sensations of which a patient may complain, may be mentioned ordinary irritability or itchiness, numbness, burning, tingling, a sensation as of the crawling of insects, and so on, of the significance of each of which a medical man can alone judge.

The occurrence of any swelling should also be noted. In the event, for example, of its being of a dropsical nature, it is important that the medical attendant should have his attention called to it at once, not only because the occurrence of dropsy is in itself always a serious event, but also because a knowledge

of the part of the body in which it first appears is often a help in ascertaining its cause. Thus, when due to kidney disease, it generally appears first in the face, when due to heart disease, in the ankles, and when due to liver disease, in the abdomen.

Bed-sores.—The need of keeping a strict watch on the condition of the back, in the case of patients who are suffering from chronic illness, has already been insisted on. This is particularly important in cases of paralysis. Bed-sores form a most serious complication of any illness, sometimes causing death, and as their prevention mostly depends on the nurse, she cannot be too strict in the application of preventive measures. Any tendency to irritation of the skin of the back or over the prominences of the hips, and still more, the least sign of bed-sore, should be reported immediately, and means should be at once taken to relieve the part from pressure. The simplest way of effecting this is to vary the position of the patient from lying on the back to lying on the side, and *vice versâ;* but this is not always practicable, and in that case an excellent method of distributing the pressure is to make a little round cushion, on the principle of an ordinary corn plaster, with a central opening about three inches in diameter, and having a breadth of four or five inches. For such a cushion, a piece of thick felt serves as a good foundation; upon this is put a thick layer of cotton wadding, and a covering of flannel or other soft material is stretched over the whole. A circular air-cushion of india-rubber will often answer the same purpose; in using this, care should be taken not to inflate it so fully as to render it hard and unyielding. If the skin is actually

broken, the use of eau-de-Cologne, or spirit and water, should be at once discontinued, and, until special directions are received, the nurse may apply an ointment of zinc and vaseline spread upon a piece of lint, or lint saturated with carbolic or camphorated oil, which must be renewed night and morning. Where a portion of the skin has sloughed, or in other words mortified, a charcoal poultice must be applied until the slough separates, when the ulcer remaining may be dressed in either of the ways just mentioned. If possible, in addition to these means, the patient should be placed at once on a water or air-bed, if this has not been done already.

Mental State.—Any alteration in manner, such as unusual irritability of temper, loss of interest in things around, slowness in understanding what is said, betrays a change in the mental condition, of which the medical attendant should be made aware, especially as patients often pull themselves together during a doctor's visit, and so may unconsciously mislead him. Still more should the nurse be careful to report any muttering, incoherence of speech, or other sign of delirium; any tendency to spill the food, or let things fall from the hands, any twitching of the muscles of the face or limbs, any picking at the bed-clothes or at imaginary objects, or any difficulty in swallowing—all these being symptoms of considerable gravity.

Respiration.—The act of breathing is more or less affected in all chest diseases. Naturally, a grown-up person breathes about eighteen times in a minute; in inflammation of the lungs this number may be more than doubled. Generally, the medical attendant records the number of respirations himself, but he may

occasionally depute this duty to the nurse. In which case she should place one hand flatly and lightly upon the pit of the stomach and count the number of times in a minute that the body heaves, a watch with distinct seconds-hand being used for this purpose. As the respiratory movements are under the command of the will, the nurse should not let the patient know that she is counting them.

The character of the breathing is also important. Thus, it may be laborious, as in bronchitis and asthma, the shoulders rising with the violence of the muscular effort each time that air is taken into the chest, or it may, while extremely rapid, as in severe cases of pneumonia, be yet perfectly easy, and unattended with any extraordinary effort. The essential character of the respiration in the two diseases being, in bronchitis, *difficulty*, and, in inflammation of the lung (pneumonia), *rapidity*. In pneumonia, again, if unmixed with any other disorder, the breathing is not only easy but quiet: while in bronchitis, it is accompanied with more or less wheezing. It must not be understood that pneumonia is the only disease in which the breathing is unusually rapid, or bronchitis the only one in which it is difficult; these two common affections are merely selected as typical illustrations.

Cough and Expectoration. — The character of a cough varies greatly in different affections and in different individuals, and this is a point that a nurse should be careful to observe. Thus, a cough may be short and dry, or may occur in paroxysms or "fits of coughing;" it may or may not be attended with pain; it may be of a noisy, barking character, or it

may be attended with a very long inspiration and a "hoop," as in hooping-cough.

The expectoration differs as much in character as the cough. It may be frothy, or viscid and ropy, adhering tenaciously to the sides of the vessel. It may be streaked with blood, as it often is in consumption and in some forms of heart disease, or it may be thick and yellow, as is especially seen in chronic bronchitis. The expectoration in pneumonia is quite peculiar; it is for the most part scanty and viscid, and at a certain stage of the disease is of a prune-juice or rusty-iron colour. The occurrence of this rust-coloured mucus in the expectoration is highly characteristic, and, when it is observed, the vessel should be put aside with special care for the inspection of the medical attendant. Other characters of the expectoration that should be noted are its quantity, and its odour. Offensive or fetid expectoration is a sign of great importance.

A patient should never use the chamber utensil as a spittoon; the latter is quite a separate article, and should always be kept by the side of a coughing patient, so that it can be reached in a second. The best form of spittoon for use in the sick-room is a half-pint pot, with handle and loose funnel-shaped lid. It is easy for the patient to use, and the medical attendant can, by lifting the lid, see without difficulty both the quantity and character of what is coughed up. It should be frequently emptied and washed both outside and inside. Unless very offensive however, it should not be emptied in the morning before the visit of the medical attendant.

Appetite.—The condition of the appetite is a matter

that it is scarcely possible for the medical attendant to observe for himself; it is, therefore, particularly necessary that on this point the nurse should report with great care. The importance of keeping an exact record of the kind and quantity of food, and the hour at which it is taken, has been already sufficiently insisted on in an earlier chapter; but under the head of appetite more than this is included. For instance, it is necessary to know whether the patient enjoys his food, or merely takes it as a matter of duty or routine, and also whether he has expressed any wish for a change of diet.

Vomiting.—Whenever vomiting occurs the nurse in recording the fact should make a memorandum of the time, and of the interval that has elapsed since medicine or food was last taken. She should also be able to tell the medical attendant whether the act of vomiting occasioned distress, or was accomplished easily and without effort. If possible, the matter vomited should be put aside in another room for the doctor's inspection, and where this cannot be done the nurse herself must notice its character—*i.e.*, the colour, smell, and quantity, and the presence or otherwise of particles of food, stringy mucus, a sediment having the appearance of coffee-grounds, or blood.

State of Bladder.—A most important point for a nurse to observe is whether the patient is able to pass urine. This is particularly necessary in cases of paralysis, and in all illnesses attended with unconsciousness—*e.g.*, fevers, inflammation of the brain, &c. In the former the bladder may be paralyzed, and in the latter the unconsciousness may so dull the senses as to prevent the patient from feeling any

desire to pass urine, even though the bladder be full. It needs no saying that such a condition requires prompt relief, and that, whenever a patient fails to pass water within the usual time, the fact should immediately be reported to the medical attendant. The cases just alluded to are instances of *retention* of urine—that is, the urine is secreted and accumulates in the bladder as usual, but the power to empty the bladder is wanting. The failure to pass urine may, however, be due to another cause—viz., *suppression* of urine, in which the kidneys no longer secrete any urine, and therefore there is none to be passed. As this condition, though requiring different treatment, is no less urgent and serious than the other, it makes no difference as regards the duty of immediately summoning medical assistance.

Urine.—A specimen of the urine should be reserved, in another room, for the inspection of the medical attendant. In hospitals the specimens should invariably be placed in a tall narrow glass, tapering towards the bottom, known as a urine glass. This should be filled night and morning, and should be covered with a loose paper cap to keep out the dust. When the urine is allowed to stand in such a glass, the medical attendant is enabled to see at once the colour of the specimen, whether it is clear or cloudy, and the nature of the sediment, if there be any. The shape of the glass facilitates the collection of the sediment for purposes of microscopical examination, should it be thought necessary.

In many cases the nurse is required to measure the quantity of urine. This is best done by collecting it for twelve hours—say from eight in the morning

until eight in the evening—measuring in a large graduated measure-glass, or earthenware measuring-jug, and noting down the quantity in ounces. To ensure accuracy the patient should be asked to use the same vessel as far as possible.

The Bowels.—The state of the bowels is only a little less important than the state of the bladder, and any constipation, on the one hand, or diarrhœa on the other, should be reported.

In many cases it is imperative that the medical attendant should see the stools; they should in that case be removed into the dressing-room or other suitable place, and covered with an earthenware lid. When the medical attendant does not himself inspect the evacuations, the nurse should be able to report to him their colour and general appearance, a knowledge of which often affords valuable information as to the condition not only of the bowels, but of the liver and other organs. The stools in diarrhœa consist of the ordinary contents of the bowel, but in a less solid form than natural; they always, however, possess a fæcal odour. When there is dysentery, on the other hand, the evacuations contain more or less mucus generally streaked with blood, sometimes with a very slight admixture of fæces, or even none at all, in which latter case the healthy fæcal odour is altogether wanting.

In cases of peritonitis, and other forms of inflammation of the bowels, no purgative medicine should ever be given on the nurse's own responsibility, the object under these circumstances being entirely to restrain the action of the bowels until the inflammation has subsided. The same caution must be given

with even twofold emphasis in reference to cases of typhoid fever. In this disease there is always ulceration of the intestine (or bowel); hence such relief as the bowels may require during an attack of typhoid must be given by means of an enema. By administering purgatives great risk is incurred of irritating the lining membrane of the bowels, increasing the ulceration, and even causing perforation, an accident which generally proves quickly fatal, and is one of the most dreaded of all the many possible complications of this disease.

A word of warning must here again be given with reference to the danger of permitting patients suffering or just recovering from any acute illness, to rise out of bed to the commode. A large number of the deaths from pneumonia occur, not during the height of the inflammation, but after the crisis of the disease has passed, from indiscretion with regard to this point. A patient, feeling, as he lies quietly in bed, comparatively well, thinks he may dispense with the bed-pan, is allowed to rise to the commode, becomes suddenly alarmingly ill, and dies, it may be, in a few minutes. A nurse should therefore always have medical sanction before giving her patient leave to rise out of bed, or even to assume the sitting posture.

This seems the most appropriate place to insist on the importance of the recumbent or lying-down posture in all cases of diarrhœa, and especially when cholera is prevalent. It cannot have escaped the notice of any person who has suffered from this exhausting complaint, how much less frequently the bowels were relaxed when he was lying down, and how, when the attack was thought to have ceased, the disturbance re-

commenced the instant the erect posture was assumed. Yet, notwithstanding this familiar experience, how few act in accordance with its teachings! It is more than probable that many fatal cases might have been checked at the outset had the simple precaution been adopted of maintaining the recumbent posture.

The Pulse.—Occasionally a nurse is called upon to note the number of the pulse at certain stated intervals. This is done by placing one or two fingers upon the radial artery, just above the wrist, on the thumb side, for a full minute by the watch, and counting the number of beats. If any difficulty be experienced in finding or counting the pulse at the wrist, the hand should be placed over the heart itself, which can almost always be felt beating a little below, and to the inner side of the left nipple. The pulse of an adult beats on an average about 72 times in the minute. This number is exceeded during infancy and childhood; thus, during the first weeks of life, it beats from 120 to 140 times in the minute, in the second year about 110 times, at the age of five about 100, and at the age of eight about 90. The pulse is quickened by alarm or excitement, even more readily in children than in grown-up persons, hence the importance of also observing the temperature, before accepting a rapid pulse as an indication of the presence of fever.

Clinical Thermometer.—To take a patient's temperature, a self-registering clinical thermometer must be used. On each thermometer is a scale of degrees of temperature, and a little arrow marks the average temperature of health, about 98½° of Fahrenheit's scale, the one commonly used in this country. The

reading of the scale is not a difficult thing to master. The thermometer is marked by a number of strong lines, between each two of which are four shorter and finer lines. The strong lines stand for degrees, the lighter lines between divide each degree into five equal parts, each part representing two "points" or tenths of a degree. In reading the thermometer, the upper end of the "index" (a small portion of mercury separate from the main column, which latter, when not heated by contact with the body, sinks down into the bulb) is to be looked for, and the degree and number of points, if any, above the degree are to be noted and written down there and then. Before using the thermometer, it must always be seen that the index is below the arrow. If it is not there already, the thermometer must be held firmly in one hand, and the index shaken down by knocking one hand several times smartly against the other.* In the adult it is usual to take the temperature in the arm-pit or in the mouth. To take it in the arm-pit, the bulb of the instrument is to be placed between the muscular folds of the arm-pit (the skin having been dried), and held in that position, while the elbow, well bent, is drawn forwards so as to rest on the patient's chest. The nurse then, having assured herself that the instrument is firmly grasped, covers the arm and shoulder with the bed-clothes, and leaves it for ten minutes, at the end of which time she withdraws it and reads off the temperature.

* The shaking down of the index must not be done with too much force, or the index may fall completely down into the bulb, when the thermometer would cease to be self-registering.

To take it in the mouth, the bulb is placed under one side of the tongue, and the patient told to close his lips, but not his teeth, upon the stem, and retain it in position for five minutes.

In the case of young children, there is no objection to taking the temperature in the bowel, which is the most accurate method of all.

The child, if not too ill, should lie on its face across the mother's or nurse's lap, and the bulb of the thermometer, having been well oiled, should be passed gently into the bowel, to the extent of an inch or an inch and a half. The nurse should keep it there for five minutes by taking hold of the stem, both hand and stem being in the meantime lightly covered by the night-dress or a blanket, to prevent the cold air from interfering with the accuracy of the observation.

The temperature should be registered at the same hours each day, and care must be taken that the patient has not been exposed for washing or other purposes for at least half-an-hour previously. The usual hours for taking the morning and evening temperature are 8 A.M. and 8 P.M.

CHAPTER IX.

Bandaging: Roller-bandages, their material, preparation, and application; simple spiral, reversed spiral, figure-of-8, double-headed, leg, spica, shoulder, head, hand and wrist—Many-tailed Bandage, for the limbs, for ovariotomy and other abdominal operations, for the breast—Other Breast Bandages—Rib Bandage—T-Bandage—Four-tailed Bandage—Starch Bandage—Plaster-of-Paris Bandage—Croft's Splints—Sling for hand or wrist—Larger Arm-sling—Pads for Splints—Perineal Band—Sand-bags—Chaff Pillows—Splints: wood, metal, gutta-percha, felt, leather, and pasteboard—Strapping—Application of Extension.

Bandaging.—The art of bandaging can only be properly taught at the bedside; the following remarks are simply intended to refresh the memory.

Roller-bandages are made of unbleached calico, muslin, domett, or flannel, torn, or otherwise divided into strips of various widths, according to the use for which they are required. The most generally useful bandage is from six to eight yards long, and from two and a half to three inches wide. This size is suitable for bandaging the head or limbs, the leg requiring a somewhat longer and broader bandage than the arm. For the fingers the breadth is about three-

quarters of an inch, and the length a yard to a yard and a half.

Preparing Bandages.—The selvedge having been cut off, the bandage must be tightly and evenly rolled either by one of the hand-machines contrived for the purpose, or by hand. To roll a single-headed bandage by hand, one end of the bandage is doubled upon itself four or five times and then made into a small roll, which is held by both hands in such a position that the end is opposite to the junction between the first and middle fingers of each hand; both thumbs are placed on the top of it, while the unrolled bandage, passing from the upper surface of the roll to the ground on the side further from the person holding it, either lies on the floor or is loosely held and straightened by an assistant. The bandage is rolled inwards and smoothed by an alternate movement of the thumbs, being meanwhile kept in position by the fingers. It is then pinned, stitched, or tied round with thread, to keep it from unrolling. To roll a double-headed bandage, the middle of the bandage should first be marked, and then each end should be rolled as far as the mark and secured.

Applying Bandages.—In applying a single-headed roller-bandage, the roller is to be held in the hand corresponding to the side to be bandaged, while the other hand is employed in pressing the outer side of the loosened end against some point on the part from which the bandaging is to begin. Two or three rather tight turns are then passed, one over the other, to keep the end from slipping. The roll must be held, not in the palm of the hand, but between the thumb and fingers. In changing the roll from

one hand to the other, only just so much of the bandage is to be unrolled as will allow it to change hands. The greatest care is required to ensure a perfectly even application, and, on the other hand, to avoid putting on the bandage too tightly, the effect of which would be to cause pain and swelling, and, it might be, even mortification of the parts below. When the whole of the bandage has been applied, the end must be doubled inwards upon itself, and secured either by a safety-pin or a stitch. Tearing the end for some inches into two strips, carrying them around the limb in opposite directions, and tying them, is another mode of fastening the end, but one that is not to be adopted unless neither pin nor needle is at hand.

Spiral Bandage (*simple*).—The simplest form of application is the spiral bandage, such as is used, for instance, in bandaging the thigh, each turn being made to overlap the one before it to the extent of one-half to two-thirds of its breadth.

Reversed Spiral Bandage.—In parts less even than the thigh, as, for example, the leg, the simple spiral will not answer: the bandage will bag at the lower edge of the folds. To accommodate it, therefore, to the irregularities in the shape of the limb, it is necessary at each turn to turn the bandage over upon itself, or, in other words, to reverse it. Practice can alone enable a nurse to do this neatly; at the same time it will be useful to call attention to the following points —viz.: (1) The turnover of the bandage should, as far as possible, be at the side of the limb, and not over a part where the bone is near the surface, as in the case of the shin-bone; (2) each angle should be

exactly above the rest, so that, when the bandaging of the limb is completed, all the angles may be in a straight line; (3) in making the turn, the roll must be held a little above the level of the limb; (4) the bandage is to be held loosely while the turn is made and tightened afterwards; (5) no more of the bandage than is really necessary should be unrolled at one time.

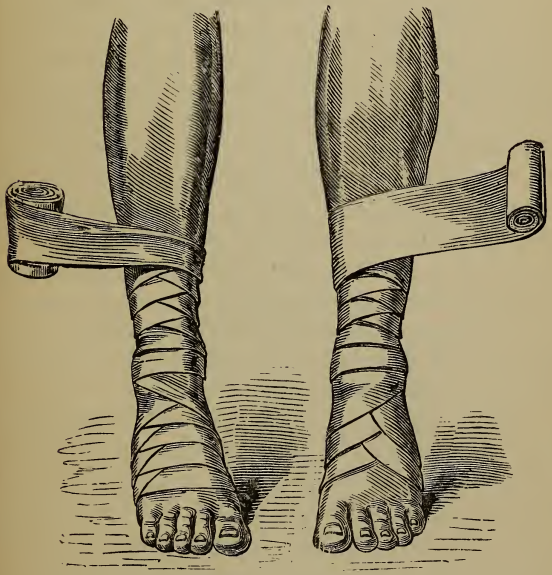
Figure-of-8 Bandage.—For carrying a bandage past a joint, as, for example, the ankle, knee, and elbow, for exerting pressure in the arm-pit, and for some other purposes, the so-called figure-of-8 is the most useful arrangement. The end of the bandage having been made fast, the roll is carried up in front of the joint, behind the limb above the joint, round the limb, down again in front of the joint, backwards around the limb below the joint, up again in front of it, and so, either carried forward up the limb, or made to repeat the figure and then carried forward.

A *Double-headed Bandage* is applied by taking a roll in each hand and commencing at the centre of the bandage. This portion being applied to the part to be bandaged, the heads are carried around the part until they meet, they are then passed from one hand to the other, and carried on until they again meet, when again they change hands, and so on. The ends are to be fastened by means of safety-pins or a few stitches.

Leg Bandage—A roll, six yards long and three inches wide, is to be held in the right hand for the right leg, and in the left hand for the left, the bandager standing in front of the limb. The foot having been raised to a convenient height by means of a stool or a heel-rest, one or two turns are carried around the foot at the root of the toes, and the bandage, the end of

which has been thus secured, is continued towards the instep, being reversed at each turn. When the instep is covered, the bandage is carried twice around the ankle in the form of a figure of 8 (already described), and is then continued up the leg, each turn being reversed (Fig. 10), until the last two or three, which

FIG. 10.



are carried straight around the leg to finish off the bandage securely below the knee. This bandage is frequently commenced by a figure-of-8 turn round the ankle.

Spica Bandage.—To retain poultices or other applications on the groin, the spica bandage, an adaptation

of the figure of 8, is the best. Two turns of the bandage are carried around the thigh of the affected side as a fastening. The roll is then carried across the groin to the opposite hip, across the back, again in front of the groin, around the thigh, and so repeated as often as may be necessary.

Shoulder Bandage.—This is used to keep dressings in the arm-pit, or n the shoulder, and sometimes forms part of the treatment of fracture of the collar-bone. A bandage, seven or eight yards long and two and a half inches wide, is passed twice around the upper part of the arm on the affected side, commencing at the inner side and being carried thence outwards over the front of the arm. After being secured by these two turns, the bandage is carried up in front and over the shoulder across the back to the opposite arm-pit, thence across the chest, and over the affected shoulder to where it started. This figure of 8 is to be repeated two or three times, and the end finally passed once or twice around the arm as at first. The first shoulder turn is to be the highest of all.

Head Bandage.—The most generally useful of the many kinds of head bandage usually described is that in which two turns of the bandage are carried around the forehead and back of the head, and the bandage, pinned over one of the ears, is then turned upon itself over the pin, and carried under the chin and over the top of the head once or twice, when it is again pinned, and a few turns are carried around the forehead again, as at first.

Hand and Wrist Bandage.—Two simple turns are made around the wrist to secure the end of the bandage; or a figure-of-8 turn made around the wrist

and hand, and the bandage commenced as near the fingers as may be wished, by a series of figure-of-8 turns, all passing from within outwards, first, over the back of the hand, then under the wrist, and down again over the root of the thumb, crossing on the back of the hand. This having been done, the remaining turns around the fore-arm may be simple or reversed, according to circumstances.

A *Many-tailed Bandage* is of service where movement of the part is undesirable, as in compound fractures of the leg, ovariotomy, &c.; it is an easy bandage to apply, and is capable of being much more extensively used than it is at present. It possesses the two-fold advantage of lessening the disturbance of wounds, &c., during the process of healing, and of materially reducing the pain which is inseparable from the moving and lifting of injured or inflamed parts.

When required for the limbs, take a strip of bandage of the length of the part that requires to be bandaged, and lay it upon a board or tray; upon this lay cross-strips, each six inches longer than the girth of the limb, and each overlapping the one above it by one-half or two-thirds of its breadth. Stitch these cross-strips at their centres to the strip lying lengthwise. To apply it:—Raise the limb, and pass under it the tray or board upon which the bandage is spread out, the strip running in the direction of the length of the limb being placed exactly underneath it, and the cross-pieces being so arranged that the last one laid on is the furthest from the patient's body; lower the limb on to the bandage and fold the strips one after another over the limb, beginning with the bottom ones.

For use after ovariotomy and other abdominal operations, it is preferable to any other form of bandage. It is then made as follows :—Take a yard and a quarter of flannel (thirty-two inches wide), tear it into seven strips of equal breadth ; of these, let two be placed lengthwise on a table at a distance of six inches apart (except in the case of very stout people, when the distance must be increased). Place the other five strips across these two, beginning at the top, and allowing each strip to overlap the one above it by one-half of its breadth. Stitch the cross-strips to one another and to the two strips placed lengthwise ; when thus completed, roll the free ends of the two vertical strips upwards to where they join the cross-pieces, securing each with a safety-pin, and wrap the ends of the cross-strips around a thin roll of stiff paper from each side towards the centre. The bandage is then ready for use.

To apply it :—Raise the body sufficiently to pass the bandage under it, unroll the cross-strips on each side, and fold them over the abdomen one after another from below upwards. Bring the lower ends of the two vertical strips forward between the thighs, and pin them to the front of the bandage, one on each side, to prevent it from wrinkling under the back or being in any way shifted from its position.* Dressings can be changed and the bandage re-adjusted without moving the patient ; though, of course, if the bandage happen to have become soiled by the discharges, it must be replaced by a clean one.

* This bandage may be used as a substitute for the binder generally worn after confinement.

Bandaging the Breast.—For the breast, either the many-tailed bandage, or the double-headed or single roller may be used.

1. The many-tailed flannel bandage.—Take a yard and a quarter of flannel (thirty-two inches wide), tear it into seven strips of equal breadth. Of these, let two be placed lengthwise on a table touching one another at the lower end, and there diverging like a pair of braces. Place the other five strips across these two, beginning at the bottom where they are in contact, and allowing each strip to overlap the one above it by one-half of its breadth. Stitch the cross-strips to one another and to the two oblique strips. In order to apply this bandage, raise the head and shoulders, and place it under the back, so that the upper cross-strips can be brought under the arms without wrinkling. Fold the cross-strips one after another across the chest, beginning from the top, and, lastly, bring forward the oblique strips, one over each shoulder, securing them to the cross strips by means of safety-pins.

2. The single roller.—Secure the end by two plain turns around the chest. Then carry the bandage over the dressings, and up to and over the opposite shoulder whence it comes down across the back, and again over the dressings, making a plain turn around the chest. The next turn goes over the shoulder, to be followed by another around the chest, and so on until the bandage is fully applied.

3. The double-headed roller.—Place the centre of the bandage (which should be eight or ten yards long and three inches and a half wide) under the arm-pit on the sound side, carry one head slantwise in front

of the chest, and the other behind. Make both to pass over the dressings, and in carrying them again around the body, arrange them so as to enfold the breast on the sound side, and a second time to cover the dressings. The application is completed by carrying one head of the roller in even turns around the chest, while the other is made to pass each time over the shoulder on the sound side, and so across the chest slantwise.

To Bandage both Breasts.—In some cases it is necesary to apply support to both breasts. The application of the bandage should be commenced as in the single roller, being carried in a similar manner under the breast and over the opposite shoulder and fixed by a circular turn round the chest, but instead of a complete turn the roller should be brought up to the back of the other shoulder and down under the opposite breast, crossing the former turn over the breast-bone. It is then carried round the side, back to the place from which it started, and the process repeated. In applying any of these bandages, the breasts must be gently raised as the turns of bandage come into contact with them.

Rib Bandage.—For use in cases of fracture of the ribs. Take a long and broad flannel roller, partly unwind it and tear the end into two equal strips, so that these will reach to the waist when placed on either side of the neck. Place them in this position with the slit in the roller over the nape of the neck, and the ends along the front of the chest, the under surface of the roller being towards the spine. At the level of the waist, reverse the bandage and bring it round the chest in a spiral manner from below, covering the

ends, which have been crossed, and secure the bandage with a running stitch; turn up the two ends, and fasten them to the main bandage. This will prevent the slipping downwards of the bandage, and keep it efficient. The circular turns should be very firmly applied.

The T-*bandage* is used for retaining dressings in the neighbourhood of the perinæum. A number of these of various sizes should always be kept ready for use in hospital practice. The shorter limb should be of sufficient length to reach round the body, just above the hips, and the other long enough to extend from the middle line of the back, downwards between the thighs, meet the circular belt, and be fixed to it in front. The longer limb should be four inches wide and divided into two about ten inches from its attachment to the belt, the width of which need not exceed three inches. It is easy to improvise a bandage of this shape from a roller-bandage.

The Four-tailed Bandage is used for injuries to the jaw. It consists of a bandage one yard long and three inches wide, with a slit three inches long in its centre for the chin to fit into, and with each end slit down to the extent of about ten inches. Fit the chin into the central slit, pass the two front strips of the slit ends around the neck to be tied at the back, and carry the other two strips upwards by the sides of the head to be tied on the top.

A Starch Bandage is prepared by unrolling an ordinary roller-bandage, drawing it through some freshly made starch, in a basin, and then re-rolling it. To make the starch solution, stir the starch in a little cold water until it becomes of the consistence of cream,

and then, whilst still stirring, add as much boiling water as will produce a moderately thick starch paste.

Before a starch bandage is applied, the part must be well washed, and bandaged with a moist flannel roller-bandage, the hollows in the neigbourhood of the joints being filled up with cotton-wool. The starch bandage is then put on like an ordinary roller-bandage, and upon it are laid splints, made by drawing strips of pasteboard about two inches in breadth quickly through hot water, and smearing them on each side with starch paste. A second starch bandage is placed over these, and the whole is covered with a dry bandage of calico or gauze. Whilst the starch bandages are being applied, some of the paste should be rubbed in with the hand. During the process of drying, which occupies from two to three days, the limb should be surrounded by sand-bags, to prevent displacement; and, when the process is complete the bandage must be cut up the front along its whole length with strong scissors, and the casing bent asunder in order to render it easier of removal. The rough edges should be covered by strips of bandage, fastened on with starch paste, and the casing should then be closed up and kept in position by two or three straps and buckles.

Instead of the first bandage of moistened flannel, a casing of cotton-wool, smeared with the starch solution, is sometimes employed. As the starch bandage shrinks during the drying, the limb must be carefully watched for any swelling or other sign of injurious pressure, which should be the signal for the immediate removal of the whole apparatus.

Plaster-of-Paris Bandages are best prepared by

rubbing dry modeller's powder well into the meshes of roller-bandages made of coarse muslin, and then re-rolling them. Provided they are covered up in a tin case, so as to keep the air from them, these powdered bandages can be set aside to be ready when required. Before being applied, they must be soaked in a basin of warm water for two or three minutes, and if, during the process of bandaging, the inner parts of the bandage are found to be insufficiently wetted, the roll is to be re-dipped from time to time for a moment in the basin of warm water which is held near, for the purpose, by an assistant. The limb must first be well washed, and protected either by a layer of cotton-wool, a dry flannel roller, or a moistened gauze bandage. The wetted plaster bandage, which should be long enough to go up the limb and down again, is then applied smoothly and evenly, like an ordinary spiral bandage, reversed turns being avoided wherever it is possible. It is often recommended to stiffen the bandage by smearing it, while it is being applied, with plaster-cream, but for this purpose the introduction of wooden splints or strips of tin is preferable, on account of their being less heavy and easier to remove. The appearance of the bandaged limb will be improved by sprinkling some dry powder upon it, and rubbing it over with the moistened hand.

In the case of children and others in whom the bandage is liable to be soiled by the urine, it should be brushed over with a coating of Damar varnish.

Where it is necessary to leave openings for the escape of secretions from wounds, balls of cotton-wool should be placed in the wounds, so as to mark, by

prominences in the bandage, the places where the openings are required, and to render it possible to cut windows out in the bandage without fear of injuring the parts below. When openings of this sort are made their edges must be protected by cotton-wool, soaked in collodion, to prevent the discharges from burrowing underneath the layers of bandage.

To remove a plaster-of-Paris bandage, a deep groove should be made by means of a strong thick knife or saw, and the deeper layers divided with scissors, the limb being protected from injury.

When powdered bandages are not at hand, ordinary bandages can be quickly prepared by mixing some plaster-of-Paris and water in a basin, constantly stirring until the mixture is of the consistence of cream. By the side of this is placed a basin containing clean water. The bandage must be wetted by being unrolled in the clean water, and then passed over into the other basin, in which it becomes saturated with the moistened plaster, and is to be re-rolled.

CROFT'S SPLINTS.—Plaster splints, applied by Croft's method, are now extensively employed in the treatment of fractures. Common household flannel is employed, and two layers are used on each side of the limb. In the case of the leg, measurements are taken from the sound limb, and the flannel cut so that two pieces when applied shall meet with accuracy along both the front and back of the leg; two others are shaped to correspond to them. The outer side only of the internal splints should be rubbed with the prepared plaster, but the external splints must be saturated with it. They should then be applied by means of a bandage possessing elasticity,

in order that some separation of the splints may take place should swelling of the limb come on later. The patient's stocking may be used as a pattern. Greater firmness will be secured if the flannel is wrung out in warm water before it is dipped in the plaster. If common salt be used to wash the hands after handling plaster-of-Paris, it will aid much in cleansing them.

Sling for the Hand or Wrist.—A large handkerchief is to be folded cornerwise into the form of a broad cravat. The hand being turned with the palm towards the chest, the hand or wrist is to be supported in the handkerchief on a level rather higher than the elbow, and the ends tied around the neck. The sling will be found to fit more comfortably if the end which passes up between the hand and the chest be carried around the neck on the side to which the hand belongs, and the other end, namely, that which passes in front of the hand, carried around the neck on the sound side.

Fig. 11.



Larger Arm-sling.—Take a large handkerchief folded once cornerwise, or a triangular bandage; pass one end around the neck on the sound side; place the point behind the elbow of the affected side; and let the other end hang down in front of the patient's chest. Bend the arm across the chest, in front of the handkerchief, with the palm against the chest; bring up

the end of the handkerchief which is hanging down, and carry it over the shoulder on the affected side, tying it to its fellow at the back of the neck. The arm will thus be supported from wrist to elbow on the middle of the handkerchief. Draw the point forwards around the elbow, and fasten it to the front of the sling with a safety-pin. (Fig. 11.)

Pads for Splints are to be made a trifle broader and longer than the splint. Soft material, such as old sheeting, is the most suitable covering for them, and the stuffing may be either tow, cotton-wool or wadding. Fold the cloth double, and cut it to the shape required; open it out, and lay the stuffing thickly and evenly over one-half of it; turn the other half over it, and stitch the edges together. For large pads it is necessary to stitch them also along the centre, through their whole thickness, to keep the stuffing from becoming lumpy and uneven.

After pads have been in use, the stuffing is to be burnt, and the covers washed.

Perineal Band.—For putting up fractures of the thigh, the surgeon sometimes requires a perineal band to be made ready. A handkerchief or a triangular bandage is to be folded; its centre is to be stuffed with a little cotton-wool, and surrounded by some thin waterproof covering, along a length of ten or twelve inches, to prevent its absorbing perspiration, &c.

Or a narrow pad, ten or twelve inches in length, may be used, with a yard of broad tape securely stitched to each end.

Sand-bags are made of various sizes, both as to length and breadth, and being chiefly used to place

against injured limbs in order to keep them in a certain position, they should not be more than one-half to three-parts full. The sand should be fine and well dried, and the covering should be such as will not allow the sand to pass through, chamois leather being perhaps the best. It is useful to have the weight marked on them.

CHAFF-PILLOWS are exceedingly useful in many surgical cases—for example, to preserve prominent points from injurious pressure, and to give additional elevation to any part. They are made of soft cotton or old linen, of sizes from six inches square upwards, and loosely stuffed with dry chaff.

SPLINTS.—For the treatment of broken bones, and other conditions, which render fixing of the limb necessary, splints of one kind or another are generally used. They are fastened on by means of strips of plaster and bandages, or by straps and buckles. They are made of various materials; those in most common use being of wood, metal, gutta-percha, felt, leather or pasteboard. The plaster-of-Paris and other bandages that harden after being applied, are frequently used instead of splints, and with the same object; these have been already described.

Wooden Splints may be either simple pieces of thin wood, flat or hollowed, or they may be shaped to the limb, and provided on the outer side with strips of leather fastened on lengthwise, in such a manner that straps may be drawn through between the leather and the splint, or they may be made flexible by being partially split by a number of cuts running lengthwise, and not entirely dividing the wood; these last-named have a lining of leather or linen pasted on,

and are known by the name of Gooch's splints. Wooden splints require careful padding lest their ends or sides should come in contact with the skin and produce sores.

Metal Splints may be either of iron, tin or zinc. Those made of iron are generally bought ready-made, of shapes and sizes varying for different cases. Tin and zinc can be cut from sheets to the required size if necessary, by means of a pair of strong scissors.

Gutta-percha Splints are useful from the ease with which they may, when warmed, be moulded to the limb. The pattern should first be cut out in paper. Then, by means of a strong sharp knife, a splint, corresponding to this pattern, is to be cut out of a sheet of gutta-percha, a quarter of an inch thick. Two vessels of water must be provided, one containing boiling, the other cold water. Both must be large enough for the splint to be placed entirely under water. In the dish of boiling water a towel is to be spread out, its ends hanging over the sides of the vessel. The splint is to be laid on the towel in the boiling water for a few minutes until it is quite flexible, when, being lifted out by means of the towel, it is to be dipped for a moment in the dish of cold water, and then moulded to the limb. It may then be taken off and hardened by pouring cold water over it. When perfectly cold, a number of small holes should be bored with a small punch, to prevent the unpleasant effects of confined perspiration. A moist flannel roller being now applied to the limb, the splint, lined with lint, is again fitted on, and the whole bound on with a bandage.

Felt Splints are a combination of leather and felt,

and are prepared by cutting a piece of the size required, laying it on a table with the leather side downwards, and brushing the felt side with a solution (supplied with the material) until the splint is saturated. It is fastened to the limb by tapes, and hardens as it dries.

Leather Splints are chiefly applicable to joints, to which felt splints do not so readily adapt themselves, and are used especially for the hip and knee.

A pattern is first made in paper, and a piece of thick sole-leather is then to be cut out by means of a strong knife, softened in vinegar and hot water, and moulded to the joint, being kept in position either with straps and buckles, or by being laced up through eyelet-holes along the edges where the two sides meet. When the splint has been allowed to dry on the limb, it should be lined with a loose piece of wash-leather.

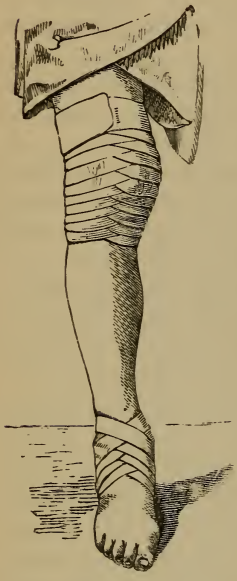
Pasteboard Splints can be cut to any size or shape with a paper pattern as a guide. They are softened by laying them upon a towel in a dish of hot water for a minute or two, and can then be readily moulded to the part. They should be lined with lint or wash-leather, and fastened on by a bandage. The objection to pasteboard is its proneness to become easily softened by the discharges from wounds.

Strapping is specially useful in ulcers of the legs, in diseased joints, and in certain conditions of the breasts of women. Adhesive plaster is generally used, but sometimes this is too irritating to the skin, and soap plaster, which does not adhere quite so well, has to be substituted.

For the legs, strips should be cut an inch and a half wide, and long enough to wrap over six inches

after passing once around the limb. All hair should be shaved off before applying them, so as to make their removal less painful. Each strip should be made to overlap the one last applied to the extent of one-third of its breadth. The centre of the strip, well warmed by holding the back of the plaster against a can of hot water, should be first applied to the back of the leg, the ends being brought round and crossed in front.

FIG. 12.



In the case of joints, the plaster should be spread on leather, and the strapping should reach some distance above and below the joint. (Fig. 12.)

APPLICATION OF EXTENSION APPARATUS.— Every nurse should be able to apply what is called an extension to a limb. This may be most conveniently done in the following way: Cut a piece of strong strapping (Leslie's is efficient) of length sufficient to extend from above the knee on each side, and form a loop fully six to eight inches beyond the foot; let the width be about two inches. In the middle of the loop place a flat piece of wood, through the centre of which a hole has been bored; on the inner side of this place a strip of strapping of the same width, but only of length

sufficient to go beyond the bony projections of the ankle; secure these by narrow circular strips to the wood; bore a hole through the strapping which shall correspond to that in the wood, and pass a string through, leaving a knot on the foot side. Apply a bandage to the limb from the ankle to above the knee. Place the long arms of strapping on each side of the limb, leaving the loop below, fix this by a turn of strapping about the calf and above the knee, turn down the long ends and apply a bandage over the strapping from the ankle upwards. The cord is then carried over a pulley fixed to the end of the bed, and the required weight attached. Counter-extension is best made by raising the lower end of the bed on blocks of wood. Care should be taken that the first bandage is not carried too far down over the heel, and that the wood is somewhat wider than the transverse measurement of the ankle. This will be found the best method to avoid sores, but the nurse should attend quickly to any complaint of pain.

CHAPTER X.

Inflammation—Formation of Pus—Local Treatment of Inflammation—Abscess and its Treatment—Ulceration—Healing of Wounds: Union by the First Intention—Granulation, Secondary Adhesion and Scabbing—Treatment of Wounds—Cleansing Wounds.—Dressings: Adhesive Plaster, Lint, Charpie, Oakum, Absorbent Cotton-wool, Dry Antiseptic Pads, Wood-wool, Drainage-tubes — Operation-room — Operation-table— Sponges—Requisites for Operations, &c.

Inflammation may be briefly said to consist of a series of changes in the blood, blood-vessels and tissues of a part—the result of some irritation (either in the form of cold or injury), or, as in the inflamed joints of gout and rheumatism, of a specific poison in the blood. It generally manifests itself by certain external signs, heat, redness and swelling, and is often accompanied with pain. It is characterized by the pouring out, from the blood-vessels into the inflamed tissues, of some of the liquid part of the blood, in the form of a clear fluid, and by the accumulation of a large number of new cells, partly derived from the blood and partly from the tissues around. It will be readily understood that these changes or processes interfere with the usefulness of the part affected, and also with

its nourishment. This is expressed, in medical language, by saying that inflammation impairs function and alters nutrition.

The changes above described may pass off, and the fluid that has been poured out into the tissues may be re-absorbed. But when the inflammation is more intense, and more particularly when it attacks certain tissues, it is very apt to end in the formation of matter or pus—that is, the cells and the effused fluid become so changed in character, that, if the inflammation be in a solid part, an abscess is formed ; if it affect one of the membranes lining the closed cavities of the body (the cavity of the pleura, for instance), or the various joints, pus accumulates in the cavities or in the joints ; while, if it be one of the mucous membranes that is inflamed, as, for example, the lining of the nose, of the throat, of the bronchial tubes, of the bladder, &c., the matter forms on the surface of the membrane and is discharged from the body with the natural secretion of the affected part. Thus, in bronchitis, when the inflammation of the mucous membrane is severe enough to give rise to the formation of matter, the matter is poured out upon the lining of the tubes, and coughed up with the expectoration, in which, from its yellow or greenish colour, and its opacity, it can be easily recognized. Speaking generally, therefore, inflammation ending in the formation of matter is less serious when a mucous membrane is involved, than when a serous membrane or a solid part of the body is affected, owing to the matter in the former case being able to find its way out by one of the natural outlets of the body ; while in the latter case it is either pent up within a cavity or joint, or

in the substance of the organ or tissue that is inflamed.

In the local treatment of inflammation, two of the most important means at our command are *cold and heat*. Cold, however, is not to be used at all stages of the process: it is only in the very earliest and in the latter periods that it is of service. In the former, cold applications often check the process, or, at any rate, prevent it from spreading over a larger area; in the latter—that is, after the acute symptoms have subsided—they give tone to the weakened and relaxed tissues. Cold is never to be applied when matter is forming, nor when mortification or sloughing has set in.

Moist heat, in the form of fomentations, poultices, or warm water-dressing, affords immense relief during the height of the inflammatory process, and especially when there is much pain, or when it becomes certain that matter is forming.

Equally important with these measures is the *position* of the inflamed part; it should be raised at least to the level of the rest of the body, if not above it. Lastly, it should be kept at *rest*, that is, it should neither be used nor moved more than is absolutely necessary.

Abscess.—"An abscess signifies a collection of pus occurring in any of the tissues or organs of the body." (Erichsen.)

Pus is very irritating and destructive to the tissues around. When once an abscess has formed, the tendency is for the matter to find its way to the nearest free surface, by gradual softening and destruction of the intervening tissues. This is called *pointing*.

Abscesses are either acute or chronic. The former are preceded by the usual signs of inflammation, and run their course quickly; the latter are often very large, are slow in forming, and give rise to little inconvenience. *Acute* abscesses require to be opened as soon as matter is fully formed, especially in situations where, if the pus is not let out, it is apt to burrow extensively, and in parts that are usually exposed to view, as the neck, for example. In this latter case the abscess, if left to itself, destroys the vitality of a portion of skin over its centre before its contents make their escape, and the scar is consequently larger than after an incision. When an abscess has been opened (without antiseptic precautions), a poultice must be applied until the discharge ceases to be purulent (that is, thick and yellow, owing to the presence of pus), when a warm water-dressing may be substituted until healing is complete. Healing should not be allowed to take place at the surface before the deeper parts have become filled up, otherwise the matter secreted in the parts that have not healed will accumulate in the cavity, from a fresh abscess, and again need an incision for its escape.

The antiseptic treatment of abscess will be alluded to in another section; and as *chronic* abscesses should never be opened except under antiseptic precautions, the consideration of their treatment must for the present be deferred.

Ulceration occurs as the result of injury or inflammation of the tissues upon one of the external or internal surfaces of the body (skin, mucous membrane, &c.), when the injury or inflammation has been severe enough to destroy the vitality of the affected part, or

at least, a portion of it. It produces open sores, which are usually accompanied with a discharge of matter, and which, when they heal, do so by becoming gradually filled up by new tissue (by granulation as it is technically called), and by the surface of the sore contracting and acquiring a new skin (that is, by cicatrization). As long as inflammation is present in or around an ulcer, the healing process cannot go on.

The treatment of ulcers varies according to their condition; healthy ulcers, covered with small red granulations, discharging thick yellow pus, and surrounded by healthy skin and a bluish line of new skin at their margin, require only a water-dressing or a simple unirritating ointment, such as vaseline or vaseline and zinc. Unhealthy ulcers require special applications, and their treatment should not be attempted except by a medical man.

HEALING OF WOUNDS.—Wounds may heal either by—

1. *Adhesive inflammation* (*primary adhesion*).
2. *Granulation.*
3. *Adhesion of two granulating surfaces* (*secondary adhesion*).
4. *Scabbing.*

1. In the first method, which is often described as union by first intention, a layer of clear fluid (lymph), derived from the blood, is poured out and glazes the surfaces of the wound, which, if brought properly together, at once unite by adhesion.

2. The second is the mode by which torn, bruised, and irregularly cut wounds are repaired. A layer of lymph is thrown out as in the first method, but here it develops into granulations, from which new tissue

is formed, as in the case of the "healthy" ulcer, the wound closing from the bottom.

3. The third method is that in which two surfaces, brought into contact after granulation has commenced, occasionally unite by a process known as *secondary adhesion.*

4. In the fourth method, which is a modification of the first, and in which the surfaces of the wound are, as in that method, covered with a layer of lymph, the serum of the blood, poured out at the surface of the wound, soon thickens, dries, and forms a protecting film, beneath which the process of healing goes on quickly. Many of the methods of dressing wounds are imitations of this natural process, and are founded on the same principle—namely, that wounds heal much more readily if they are sealed up so as to exclude air.

TREATMENT OF WOUNDS.—In the treatment of wounds the object is to put them under the best conditions for healing. In the case, therefore, of wounds caused by cutting instruments (incised wounds), the points to attend to are:—(*a*) the stoppage of bleeding; (*b*) the thorough cleansing of the wound from dirt and other impurities; and (*c*) the bringing close together the cut surfaces and edges of the wound.

The wound should be cleansed by pouring a stream of water over it, and by dabbing the surface with bits of cotton-wool or tow, or with a clean sponge, touching it as little as possible. The stoppage of bleeding, so far as it lies within the province of a nurse, has been already described.

The closure of the wound is effected by pressing

the edges together either by means of a pad of dry lint fastened on by a bandage, as is generally sufficient in the case of scalp-wounds, or by means of strips of sticking-plaster; or, in the case of larger wounds, by sutures of silk, wire, horsehair, or catgut, with pads of dry lint or cotton-wool, to press the deeper parts together. The dressings should be kept on by a bandage. These first dressings should remain undisturbed for three or more days, unless there be pain or swelling, when they should be at once removed. The time for removing sutures, and the kind of dressing to be employed during the after-treatment, depend upon the situation and condition of the wound, and should be left entirely to the decision of the medical attendant. Bruised or torn wounds are just as much in need of cleansing, but they bleed less as a rule, and they usually heal by granulation. The edges of the wound having been brought together, and either a drainage-tube inserted, or a sufficient opening left for the escape of discharge, it is generally covered, not with a dry pad, but with oiled lint, water-dressing, or stimulating lotion, and then the part is raised and kept at rest. Care must be taken that these wounds do not heal at the surface while matter is forming underneath.

Cleansing the Wound.—Cotton-wool or fine tow should be used in preference to sponges for the washing of wounds, especially after the first dressing. These can be thrown into the fire after being once used, while sponges are too expensive to be dealt with in that way, and may, in spite of careful washing, be the means of producing mischief when used for other

patients. Before a wound is washed or dressed the bed should be protected by means of a piece of waterproof sheeting. Hair around a wound always gives trouble, and should be shaved off or closely clipped.

Dressings.—*Adhesive plaster* consists of resin, litharge and soap, spread on very thin linen. In preparing the plaster for use, the dust should first be wiped off with a dry cloth, and strips, varying in breadth from a quarter of an inch to an inch and a half according to requirement, should then be cut evenly the long way of the sheet. Plaster cut crosswise does not hold well. The strips must be warmed either in front of the fire, or by holding their linen side against a hot-water tin, or, still better, by passing them quickly, from end to end, over the flame of a spirit-lamp. When a wound is being strapped, its edges should be pressed together by the finger and thumb of the left hand, while one end of the strip, held in the other hand, should be made to adhere to the skin at a distance from the wound, and brought tightly across it.

When removing the plaster, one end of each strip should be separated up to the wound, and then the other end in the same way, so as to prevent the wound from being torn open. Skin, soiled by plaster, can be easily cleansed by rubbing it over with a little warm olive oil or turpentine, and then washing it with soap and water.

Lint is a soft woven linen, with a nap on one side; it should be cut, not torn, and in applying it the smooth side should be placed next the skin.

Charpie is more used on the continent of Europe than in Great Britain. It consists of "ravellings, or shreds, torn or scraped from linen;" when torn, thread

by thread, from pieces of old linen, two to six inches square, it is called torn or rough charpie; when prepared by scraping linen with a knife, it is softer and more downy, and is called scraped charpie.

Oakum "is old rope, shredded in prisons and workhouses, and carded by machinery. It is of a bright brown colour," and possesses a tarry smell. As a dressing it has two great advantages—viz., it absorbs discharges, and, owing to the tar it contains, destroys bad smells. Tenax is a kind of oakum, specially prepared for surgical use.

Absorbent Cotton-wool (wool, deprived of its oil) has the power, which ordinary cotton-wool has not, of absorbing discharges, and keeping a wound dry. It is a comparatively recent and very valuable addition to the dressings at our command.

Dry Antiseptic Pads consist of absorbent cotton-wool, carbolized, and wrapped in gauze covers. They are made of various sizes, and, before being applied, require to be held in front of the fire for a few minutes, when they swell up and become very soft and downy.

Wood Wool, impregnated with corrosive sublimate, is a new and very valuable antiseptic and absorbent dressing. It is most conveniently applied in the form of dry pads, covered with antiseptic gauze, or muslin.

Drainage-tubes are pieces of india-rubber tubing pierced with numerous holes, and varying in size according to the size of the wound for which they are required. The tube should be cut off at its outer end, on a level with the edges of the wound, and a silk loop should be passed through the tubing by means of

a needle at two opposite points near its outer end, the ends of each loop being knotted, and fastened down straight on the neighbouring skin, by means of a strip of adhesive plaster. Sometimes both ends of a drainage-tube are brought outside. They may in that case be conveniently connected by tying them loosely together with ordinary ligature-thread.

Operation-room.—The operation-room should always be well warmed beforehand, and in the case of operations on the throat and windpipe should be heated to a temperature of 70° Fahr., and the air moistened by the steam from a kettle kept boiling for an hour or more.

The Operation-table must be covered with a folded blanket, and if the part to be operated upon is the head or face, a piece of red flannel should be laid over the pillows. Macintosh sheeting must be placed over the blanket, and upon the macintosh a folded sheet. The floor must be protected by a thick sprinkling of sawdust, or a sawdust tray.

Sponges used for operations should be kept for that purpose only, and when not in use should stand in a jar containing a solution of carbolic acid, of the strength of an ounce of carbolic acid to each pint of water. After an operation, the sponges should be well washed and then allowed to stand in a basin of water for some days. Any clotted blood in them will by that time have softened, and can be easily washed out, before they are replaced in the jar.

It is impossible to wash sponges properly while an operation is going on, and for that reason a large number should always be prepared beforehand. For cleansing sponges during an operation, a solution of

carbolic acid, one part in forty, should be prepared, by adding to a strong solution of the acid (one part in twenty, or one ounce of acid to each pint of water) an equal quantity of hot water that has been recently boiled. When they are handed to the surgeon they should be thoroughly squeezed until not another drop can be pressed out.

REQUISITES FOR OPERATIONS.—The following things should be provided for all operations:—Washhand-basins, jugs of hot and cold water, soap, nail-brush, towels, safety-pins, scissors, a tray for the instruments, several empty basins, strips of adhesive plaster of various breadths, strips of wet lint and dry lint, cotton-wool, tow, bandages, ligatures, suture-needles, oiled silk, a feeding cup, a Higginson's syringe, a supply of brandy, an electric battery, if there be one at hand, and a small basin in case of vomiting.

If chloroform, or other anæsthetic is to be given, the patient must take no food for at least four hours previous to the operation, and the meal then taken should be a light one.

The bed to which a patient is to be carried must be prepared before the operation commences; a macintosh and draw-sheet, and a bed-frame to keep the clothes off will be usually necessary. A hot-water bottle for the feet should also be in readiness.

For at least some hours after a severe operation, a patient should on no account be allowed to sit up, or even to raise the head from the pillow.

It is usual to prepare a patient for operation by administering a sharp aperient the night before, and

a simple enema on the morning of the operation ; the surgeon should always be asked what preparations he desires to have made, as this is frequently of great importance, and varies with the individual patient and the part of the body on which the operation is to be performed.

CHAPTER XI.

The Antiseptic Method of Treatment—Principle on which it is Founded — Substances employed: Carbolic Acid, Corrosive Sublimate, Iodoform, Boracic Acid, Salicylic Acid, Chloride of Zinc, Eucalyptus Oil, Thymol, Tincture of Iodine, Salufer, &c.

The Antiseptic (or Aseptic) Method of wound treatment is based on the fact, now established by abundant scientific evidence, that the main cause of putrefaction is to be found in the air, in the form of exceedingly small solid particles of living matter.

It has been ascertained that the air of a room, in which, for example, operations are about to be performed, can be acted on in such a manner as to render these solid particles harmless, by using certain chemical substances (*antiseptics*), of which carbolic acid may be taken as the type. These particles are, however, not only contained in the air, but in the dust which has settled on every object in the room, so that, if we wish to deprive of their injurious properties *all* the particles which may by any possibility gain access to a wound during an operation or a dressing, we must act upon everything which may come in contact with the wound, as well as upon the air itself. This

is what the antiseptic method of treatment aims at accomplishing.

The number of antiseptic agents used in surgery is numerous, and the way in which they are employed varies greatly, but the principle remains the same.

Those which are of a volatile nature should be kept in a tin case with closely fitting lid. They will in this way also be preserved free from dust.

Carbolic Acid.—This substance is sold in the pure state in the form of colourless crystals, and is then known as absolute phenol. Applied in this form it is a strong caustic. It is employed in surgery, (*a*) In the form of watery solutions of different strengths, the chief being a strong solution, containing an ounce of the pure acid to each pint of water (known as the 1 in 20 solution), and a weaker solution, containing half an ounce of acid to a pint of water (known as the 1 in 40 solution). These solutions or lotions should be quite clear, and should be prepared with hot water so as not to contain any oily-looking particles. (*b*) Mixed with olive oil in the proportions of 1 in 10 and 1 in 20. The former is occasionally used as a dressing for wounds, the latter as a lubricant for catheters and similar instruments. As the oil, however, readily parts with the acid, a solution in glycerine (*c*) is often substituted for it, in the proportion of 1 of the acid to 5 or 10 of glycerine. (*d*) Mixed with resin and paraffin and applied to gauze, or unbleached tarlatan; this does not readily wash out, and forms the most important of the wound coverings employed in the antiseptic system of dressing, being used for dressings wet and dry, and for bandages.

(*e*) Carbolic wool, made by impregnating absorbent cotton-wool with carbolic acid; this is seldom used, as it soon loses the acid. (*f*) Carbolized ligatures, for tying the blood-vessels, made of either catgut or silk, of different thicknesses, and wound on reels, which are preserved in stoppered bottles, partly filled with antiseptic solutions, the catgut being kept in the oil, 1 part to 5, and the silk in a solution of 1 part in 20 of water. (*g*) Protective, the name given to oil-silk specially prepared, and coated with a solution of starch; it is intended for application over the wound, and protects it from the irritating effect of ordinary carbolic dressing. (*h*) Thin macintosh cloth, hat-lining, or jaconet, used in the Listerian dressing, for placing underneath the outer layer of the dry gauze, the india-rubber side towards the wound. Its action is to prevent the discharge from penetrating through the dressing, and to distribute it throughout.

Perforated drainage-tubes of red india-rubber are usually wanted at an operation, and should be kept, of various sizes, in a wide-mouthed covered glass jar filled with solution of carbolic acid, 1 in 20; or of corrosive sublimate, 1 in 1000.

When Sir Joseph Lister first introduced the antiseptic treatment of wounds he used carbolic acid exclusively. He has since modified his method in various ways. Nevertheless, a nurse should be acquainted with the details of the earlier method, as it is still adopted by many eminent surgeons (see p. 157). A spray-producer is one of the most important requisites, and may be worked by steam, hand, or foot; it is constructed on the same principle as the throat spray-apparatus, already described. In the former—*i.e.*, the

steam-apparatus, a 1 in 20 solution of carbolic acid is placed in the bottle. Steam is produced by boiling water in the body of the apparatus over a spirit-lamp, which should be lighted ten minutes before the spray is wanted. The steam mixes with the carbolic acid, and, owing to this, the spray is not of the same strength as the solution (1 in 20), but is reduced to 1 in 30, or 1 in 35. Before the surgeon's arrival, the nurse should make sure that the lamp is well supplied with spirit, and that the wick is good, that the boiler is sufficiently full of water, and that the tubes of the apparatus are not blocked up. It is always irritating to the operator when the spray suddenly fails in the midst of an operation from inattention to one or other of these points. Sometimes it will fail in spite of every care, so that it is always necessary to have at hand a piece of rag, called the "guard," lying in a small basin of carbolic lotion,* ready to be thrown over the wound until the apparatus can be set going again.

The *hand* or *foot* spray-producers are more uncertain and altogether less satisfactory.

Corrosive Sublimate, or Perchloride of Mercury.—This salt is a deadly poison, as well as being a germicide, and should be used with great care. It is cheap and is non-volatile. It is now the most universally employed of the different antiseptic substances, and has proved most efficient. It is used as (*a*) a solution in water, 1 in 1000, for purifying the hands, &c. (*see* p. 161), and 1 in 2000, or even weaker, for the irrigation of wounds. (*b*) Alembroth wool, or absorbent

* 1 in 40.

cotton-wool containing about 2 per cent. of the salt with ammonium chloride added to it (the compound, sal alembroth, being formed). It has the property of retaining its antiseptic qualities for an indefinite time. (*c*) Alembroth gauze, a soft material (fine tarlatan), impregnated with sal alembroth. (*d*) Pine-wood wool, prepared from pine-wood fibre, and impregnated with corrosive sublimate, 1 in 3000. This is made into pads by being put into muslin bags, and, being the most absorbent dressing known, is particularly useful where the discharge is profuse, or where frequent change of dressing is undesirable.

These various preparations are often coloured blue by means of aniline in order to distinguish them. As steel instruments are readily corroded by solutions of corrosive sublimate, they must be disinfected by other means. They are generally immersed in a solution of carbolic acid (1 in 20).

Iodoform is met with in the form of yellow crystalline flakes or a yellow powder; it has a strong, unpleasant odour, and is insoluble in water. Being a strong antiseptic, it is largely employed in surgery. Iodoform gauze, iodoform wool (10 per cent.), and iodoform ointment, are manufactured.

Boracic Acid is in the form of white crystals. It is one of the least powerful of the antiseptics, but possesses no irritating properties. (*a*) A solution is prepared by adding 1 ounce of the acid to 20 of hot water, allowing this to cool, and then removing the excess of crystals deposited. (*b*) The lint and wool made with this acid are usually coloured pink, and crystals can be seen on the surface. (*c*) The ointment used is a compound of vaseline, paraffin, and

boracic acid. (*d*) Boro-glyceride, a chemical combination of boracic acid and glycerine, is a soft cream-like substance, possessing little advantage over the simple solution.

Salicylic Acid is a less irritating substance than carbolic acid, to which it is closely allied, and is without poisonous properties. The preparations used are the wool, jute, and silk; all contain from 3 to 10 per cent. of the acid. It should not be used for instruments, as it corrodes them.

Chloride of Zinc is used in the form of a solution of ten grains to the ounce, to apply to the surface of wounds. Thus applied, it has the power of preventing absorption for three days, and it also prevents decomposition. It is not used as a continuous application, excepting in very weak solutions to ulcers and sloughing wounds.

Eucalyptus Oil is a powerful antiseptic, and has been used in the same way as carbolic acid and in similar preparations where the latter has disagreed.

Thymol is employed in a similar manner, but is less efficient.

Iodine is a very powerful antiseptic, and is used in solution (two drachms of the tincture to a pint of warm water) as a lotion, and to clean sponges.

Salufer, sodium fluo-silicate, is reported to be a powerful, non-irritating germicide in a solution of one grain to the ounce. It corrodes steel instruments. Its value as an antiseptic is not yet determined.

Potassium permanganate (a solution of which is known as Condy's fluid); acetate and subacetate of lead; benzoic acid; terebene, a refined form of turpentine; alcohol, and some other substances, possess

antiseptic properties, but are not much used as antiseptic dressing .

Chlorinated soda lotion, made by adding three and a half ounces of the solution of chlorinated soda to sixteen and a half of water, is a most useful application to foul and sloughing wounds, applied as warm water dressing, or as a poultice with linseed; it cleans the surface rapidly. From the fact of free chlorine being evolved, it is a strong disinfectant. It must be further diluted with water as required.

CHAPTER XII.

Antiseptic Precautions during the Performance of an Operation, the Dressing of a Wound, and the Opening of an Abscess: the "Listerian" Carbolic Acid Dressings—Corrosive Sublimate Dressing. Symptoms of Poisoning by Carbolic Acid, Corrosive Sublimate, and Iodoform when absorbed.

The manner in which most of the materials, mentioned in the last chapter, are used will be explained by describing the precautions adopted, during

(1) The performance of an operation,
(2) The dressing of a wound, and
(3) The opening of an abscess.

Antiseptic Precautions during the Performance of an Operation.—When an operation, no matter how trivial it may appear, is about to be performed, all the instruments should be boiled in water some hours previously, and then arranged in a porcelain or vulcanite dish, containing a 1 in 20 solution of carbolic acid in sufficient quantity to cover them. The instruments must be opened out as far as possible when they are placed in the solution, in order that the antiseptic may find its way into every crevice; thus, all forceps which lock by a catch should be laid widely open and toothed instruments should be

thoroughly cleansed before being put in. The needles, sutures, wet-gauze dressing (to be spoken of presently), and apparatus for drainage are to be placed in a similar tray containing some one-in-forty carbolic solution (or solution of corrosive sublimate, 1–2000). For washing the sponges, two large basins of one-in-forty carbolic acid solution (or solution of corrosive sublimate, 1–2000), should be got ready, so that if the fluid in one become very much soiled, there is another at hand. Warm solutions, of the required strength, may be prepared for this purpose by pouring into each basin a measured quantity of the one-in-twenty solution of carbolic acid (or the 1–1000 solution of corrosive sublimate), and adding an exactly equal quantity of boiling water.

The gauze dressings should be prepared beforehand, by cutting a piece of gauze, large enough when folded into eight thicknesses, if the operation be conducted with the earlier "Listerian" precautions, to cover the skin for some distance around the wound, the extent of the distance being dependent on the amount of discharge expected. Underneath the eighth or uppermost layer, the pink macintosh is to be placed cut to the size of the folded gauze. A smaller piece of gauze is at the same time to be put to soak in the tray of 1–40 carbolic lotion (or 1–2000 sublimate solution), ready to be folded to a suitable size for the wet dressing. Some protective must also be placed in readiness, though the piece cannot be cut until later on, when the exact size of the wound is known.

Everything being now prepared, and the patient having been placed under the influence of the anæsthetic (ether, chloroform, &c.), the operator and his

assistants wash their hands in 1–40 carbolic (or, in very special cases, such as the laying open of joints, in the stronger solution), and the spray is made to play over the part to be operated upon. The skin of the patient at the site of the operation is to be thoroughly washed with soap and hot water, and a soft nail-brush, and then bathed with a solution of carbolic acid, 1 part in 20. As in other modes of operating, any hair in the neighbourhood must be shaved off. A towel, well soaked in the stronger antiseptic solution, is placed within the cloud of spray and upon the operating-table, between patient and operator, to serve as a temporary resting-place for any instrument the operator may wish to lay down during the progress of the operation. All instruments, sponges, ligatures, drainage apparatus, sutures, &c., must be handed to the operator in such a manner that he has not, in reaching them, to put his hand outside the cloud of spray. When the operation is over, the bleeding vessels tied, proper drainage secured for the discharges, and the edges of the wound brought together, a piece of protective is to be cut of a size just large enough to cover the wound (but not to cover the opening of the drainage-tube), and having been dipped in a 1–40 solution of carbolic acid, is to be handed to the surgeon to place over the wound. Then the wet-gauze dressing, squeezed out of the lotion as already described, and lastly, the dry-gauze dressing, with its layer of macintosh and bandage, are applied. Whenever practicable, as in operations on the arms and legs, the edges of the dressing should be secured by elastic bandages, to prevent them from gaping when the part

is moved, and so admitting air underneath the dressing. The spray may then be turned off.

The folds of dry carbolized gauze are for the purpose of absorbing the discharge, should there be any, while its large size and its many layers are intended to prevent any portion of the discharge from finding its way so far from the wound as to be exposed to the air, in which case putrefaction would be very liable to occur, and spread inwards to the wound. The wetted gauze underneath is to render harmless, by means of the active carbolic acid it contains, any dust which may have settled on the surface of the dry gauze.

Should any instrument, in the course of the operation, accidentally drop upon the floor, or upon any part which is not within the influence of the spray, it must be dipped in the carbolic lotion before being again used. Similarly, if the operator, or any of his assistants, wipe his hands on a dry towel, he must again wash his hands in the antiseptic solution before going on with the operation. The same precautions are necessary with regard to sponges; and, indeed, to everything that may be brought in contact with the wound. When this method is unsuccessful in keeping a wound free from putrefaction, it is always, says Professor Lister, our duty to consider in what particular we have failed to keep the wound uncontaminated.

Various modifications of the above method have been proposed, and have been adopted with satisfactory results by many even of those who continue the use of carbolic acid as the antiseptic. It is no longer considered necessary to employ the spray during an operation, and the surgeon is relieved of a great dis-

comfort, and his patient of a fruitful source of chill; some, however, like it to play in the room in which the operation is about to take place for several minutes before the operation commences.

When corrosive sublimate is used, the solution of 1 in 1000 may be taken to represent the 1 in 20 carbolic solution, and 1 in 2000 the 1 in 40 carbolic solution. Soap should not be used with corrosive sublimate solutions. After washing the hands and cleansing the skin around the wound with soap and hot water, the soap should be rinsed off before the sublimate solution is applied. The wound should be irrigated at intervals with a solution of 1 in 2000, during the progress of the operation, and the surgeon should have a basin containing the stronger solution (1 in 1000) ready for his hands. No protective need be used to cover the wound, about four layers of gauze wrung out in a solution of 1 in 2000 being applied directly, covered with more gauze (dry), then cotton-wool, and a bandage. Instead of the wet gauze, some operators prefer to use dry antiseptic pads. If no drainage-tube be employed the dressing may be left on for some days, the wound healing as under a scab.

2. Antiseptic Precautions during the Dressing of a Wound.—For the sake of illustration, the method of changing the dressings after operation will be here described. The spray will be required, as before, and a basin containing a solution of carbolic acid (1 in 40). In the solution must be placed a pair of scissors and dressing-forceps; a piece of loose gauze and a piece of protective being immersed either in the same basin, or in a solution of corrosive sublimate,

1 in 2000. A hand is placed over the centre of the dressing while the bandage is being removed. When this is done, the spray is turned on, the surgeon washes his hands in the antiseptic solution, and carefully removes the superficial and then the deep dressings, laying bare the wound. If all is right, the fresh dressings, protective and wet gauze are immediately applied, the skin and the wound being well washed with the solution before the folds of dry gauze are laid on and the bandage re-applied.

If a drainage-tube has been used, it is not usually removed until the third day, unless it be intended not to replace it. On and after the third day, it is easy to get it into its place again; it may therefore be taken out, washed in the antiseptic solution, and shortened, if desirable, by cutting a piece from the inner end before putting it back into the wound. A sinus-forceps should be placed in carbolic solution, to be ready if required for replacing the drainage-tube.

The wound should not be syringed without express instructions from the surgeon, and, in syringing, no force should be used.

3. Opening an Abscess by the Antiseptic Method. —The abscess is opened under the spray, and with the precautions as to the cleansing of the surrounding skin and of the operator's hands already described as requisite in the case of other operations. The opening is made large enough to admit a large drainage-tube, and the cavity of the abscess is emptied as thoroughly as possible. The drainage-tube having been introduced, and secured from slipping into the cavity, a piece of gauze dressing, soaked in the milder

antiseptic, and squeezed dry, is placed over the opening, no protective in this instance being required. The remainder of the dressings, and the mode of changing them, are the same as in the treatment of wounds. Chronic abscesses are slow to heal, and, though they generally do well in the end, they often require absolute rest in bed for a long time. The drainage-tube (or tubes, if the abscess cavity be large) must be shortened from time to time as the cavity closes, but should not be removed until the third day on account of the difficulty that may be encountered in replacing them.

Many of the antiseptic substances are poisonous, and, as they sometimes exert their poisonous action through the wound or the surface to which they are applied, it is advisable that the symptoms usually produced by the more important of them should be borne in mind.

We have not space to do more than mention a few of the leading symptoms.

In poisoning by *carbolic acid*, usually the first thing noticed is that the urine after standing is of a dark olive-green colour, sometimes almost black. Then follow headache, giddiness, vomiting (often severe, sometimes followed by low temperature), great depression, or even collapse.

Solutions of *corrosive sublimate* still more frequently produce symptoms of serious character: diarrhœa with straining, pain in the abdomen, and vomiting; the motions may contain blood, and the patient may pass into a condition of collapse, followed by death.

Iodoform seldom causes symptoms of poisoning except in children or in people who are old and weak.

The patient loses appetite and strength, and complains that everything tastes of iodoform. The temperature may rise to 104°, whilst the pulse becomes much more frequent. The nervous symptoms may be very marked, and vary from maniacal excitement to mental depression and drowsiness, which may end in collapse; this condition may come on rather suddenly. Fatal results have been much more commonly met with in Germany than in this country.

CHAPTER XIII.

Disinfection and the Nursing of Infectious Fevers: Nature of Contagion—Differences in the Mode of Propagation, &c., of the Infectious Fevers—Precautions Necessary to Prevent the Spread of Infection—Separation of the Sick—Employment of Heat and other Modes of Disinfection, with Rules—Special Points in the Nursing of some of the Infectious Fevers: Measles and Whooping-cough, Typhoid and Cholera, Typhus, Diphtheria, Scarlet Fever, and Smallpox.

Nature of Contagion.—It has long been known that the muddy appearance which is always observed, after the lapse of a few days, in any sugar-containing liquid—such, for example, as an infusion of malt or a simple solution of sugar in water—is due to the growth within the liquid of a low form of vegetable life, the development of which is accompanied with a series of changes which we call fermentation.

It has also been established that this plant or fungus does not arise spontaneously in the fluid, but from certain very small solid particles of living matter, introduced from the outside air, which particles are really the seeds of the plant floating about in the air and waiting for suitable conditions, such as are found

in the sweetened fluid, in order to develop into full activity.*

Every year new facts are coming to light which render it increasingly probable that the infectious diseases are propagated in a somewhat similar manner, namely, by the agency of minute particles of living matter, called *bacteria* or *microbes*, given off from some part of the body of the sick person, and carried in the air, or in water or food, to other persons, in a certain number of whom, the soil being suitable, the poisonous particles take root. Having thus taken root, they remain a certain length of time in the body,

* From a very large number of experiments that bear upon this point, the following is selected as an example; it is one that has since been performed over and over again by other scientific men with a similar result. In the year 1854, two German observers put into a flask a quantity of fluid containing some sweet fresh malt and some hops. They stuffed the neck of the flask loosely with cotton-wool, and then boiled the flask and its contents until the flask and neck were thoroughly heated as far as the cotton-wool, in order to destroy any living particles which might exist in the infusion or on the sides of the flask. After twenty-three days the fluid remained clear and unaltered. The cotton-wool was then removed, and the air admitted without the filtering that it had received so long as the wool was there. In a week, the fluid was muddy and was found to have undergone fermentation.

This experiment shows (1) that the fungus did not grow of its own accord, as it were, in the fluid, but was introduced from outside; and (2) that the substance so introduced was of such a nature that the cotton-wool sufficed to entangle it and bar its entrance, or, in other words, that it consisted not of gases, which would easily find their way through the wool, but of particles of solid matter which would be stopped by it.

exactly as a seed does in the earth, without giving any outward manifestation of their presence, after which the disease declares itself. And the disease thus produced will be as certainly the same as the one from which the infection originated as the tree growing from an acorn will be an oak, not a poplar or a willow. Thus, the poison from a case of scarlet fever will never produce anything but scarlet fever, or that from a case of measles anything but measles ; individual cases differing, meanwhile, in their symptoms and their severity, just as widely as one oak-tree differs from another in its height and in the shape of its branches.

Differences in the Mode of Propagation, etc., of the Infectious Fevers.—It will be convenient here to notice some points in which the various infectious diseases differ from one another as to their mode of propagation, &c.

1. The part of the body from which the poison is given off is not the same for each disease. Thus, in diphtheria and whooping-cough the infectious particles are given off in the breath ; in scarlet fever, measles and typhus, chiefly in the breath, but also from the skin, and in the discharges from the nose and mouth ; in typhoid and cholera in the discharges from the bowels, while in smallpox, the poison of which is exceedingly energetic, they appear to be given off from all parts of the body and to be present in all the discharges.

2. The infectious particles may be so light as to float in the air and be readily wafted to a distance, as in smallpox and measles, or they may be so heavy as to settle amongst the dust on the floor, clothing and furniture, as in the case of scarlet fever.

3. Infection may not take place except when contact with the patient is moderately close, as is the case in typhus, the poison of which appears to exert its influence only within a very limited area. While, on the other hand, the poison may, as in scarlet fever, lie inactive, attached to articles of clothing, &c., in a drawer or cupboard, for months or even years, and then, finding appropiate soil, may display the greatest activity.

4. In some instances the infection is transmitted in drinking-water and milk. For example, the drains of a house in which a typhoid patient is lying ill may happen to be defective, and the well or water-tank contaminated by sewage-matter in consequence. It is easy to see how, in that case, the fever poison might be conveyed to any person using the water from that particular source. The spread of typhoid, diphtheria, and scarlet fever has, moreover, often been traced to the milk sent out from farms or dairies where polluted water has been used for washing the milk-cans, or for other purposes connected with the business.

Similarly, outbreaks of cholera have been discovered to be due to the use, for drinking purposes, of water fouled by sewage containing the excreta of cholera patients. It should be remembered that cholera and typhoid may also be contracted from breathing the effluvia arising from the excreta of the sick.

5. The periods at which the disease first becomes infectious, and at which the risk of infection is greatest, are not the same for each. Thus, measles and whooping-cough are believed to be infectious before the occurrence of the specific symptoms—that is to say, before the rash appears in measles, and before the

characteristic "whoop" is heard in whooping-cough; on the other hand, scarlet fever is probably not very infectious before the throat-symptoms are present, while it certainly continues to be infectious so long as any affection of the throat remains, and during the time that the skin is peeling, although the patient may by that time be apparently well.

6. The incubation period, or the period which elapses between exposure to infection and the appearance of the earliest symptoms of the disease, varies considerably in the different fevers, and to a slighter extent, even in different patients suffering from the same fever. The following are merely to be taken as the average periods of incubation for the various diseases mentioned. In chicken-pox, German measles, mumps and whooping-cough this period is about fourteen days, in smallpox and typhus twelve days, in measles ten or twelve days (or fourteen to the first appearance of the rash), in scarlet fever generally not more than three or four days, and in diphtheria from two to five days.

7. Lastly, there are some conditions which are known specially to favour the spread of certain of the infectious fevers. Thus, typhus is a disease specially associated with overcrowding, relapsing fever with want, typhoid with defective drainage, and smallpox with neglect of vaccination. So, too, the spread of diphtheria is often traceable to the neglect of slight cases of sore throat, which, although in reality examples of this disease, pass unsuspected because in so mild a form; while scarlet fever is particularly apt to arise from carelessness in dealing with infected clothing, and from allowing children who are recover-

ing from this disease to return to school before the throat is perfectly well and the peeling of the skin completed.

Precautions Necessary to Prevent the Spread of Infection.—The chief means at our disposal for endeavouring to hinder the spread of infection in individual cases of infectious disease, are (1) the separation of the sick person, either by removing him to hospital, or, if that cannot be done, or is not desirable, by isolating him in his own home. (2) The adoption of certain means known to be capable of destroying the activity of the infectious particles, namely, submitting them to the action of intense heat, exposing them freely to the atmosphere, and acting upon them chemically by certain agents called disinfectants.

Separation of the Sick.—Wherever patients suffering from smallpox, typhus, or scarlet fever, cannot be thoroughly isolated at home, they should be sent to the smallpox or fever hospital, as the case may be; indeed, as regards smallpox, there can be no doubt that *every* case should be sent into the hospital, on account of its being so pre-eminently contagious in all stages of the disease. In scarlet fever, too, early removal is exceedingly desirable, being usually an effectual means of preventing the further spread of the disease, except, of course, where two or more individuals have been exposed to a common infection. In the case of typhoid, it is a less urgent matter (provided good nursing be obtainable at home, and proper means be adopted for disinfecting the patient's excreta) because the risk of contagion is less; while, as to measles and whooping-cough, removal to hospital

cannot be expected to have much influence in checking their spread, on account of their being infectious at a very early stage.

When a patient is treated at home, he should be at once separated, as completely as possible, from the other inmates of the house, a room at the top of the house being set apart for him, and the whole of the top floor devoted to the exclusive use of himself and those engaged in immediate attendance upon him. No visitor, or other inmate of the house, should be admitted to the sick-room, and the nurses should sleep on the same floor (or, if there is only one nurse in attendance, in the same room), that there may be no communication with the other members of the household; food for both patient and nurse should be placed on a table outside the door of the chamber, and what is not eaten should be burnt. The nurse should, when attending on infectious cases, avoid long sleeves and discard the use of cuffs. Her dress should be of print or other washable material, and should be changed when she leaves the house for her daily walk. In passing out, she must not stop to speak with any one by the way, or enter any room on the other floors. All needless drapery should at once be taken from the room, spread out for some hours in the open air, and then taken to some other part of the house. Most of the carpets and curtains of a room can be dealt with in this way.

The lobby outside the room should be well ventilated, if possible, by a cross draught. Except in the very hottest weather, a fire should be kept constantly burning in the room. It promotes ventilation by affording the best possible outlet for the foul air; and

by enabling the windows to be opened more freely; and, secondly, it permits fragments of food, dressings, &c., to be burnt and so quickly and finally disposed of. The importance of attending to the ventilation of the sick-room itself can scarcely be overrated. Fresh air is a direct restorative to a fever patient and is the great natural disinfectant. To keep the room of a patient suffering from fever closely shut up or insufficiently ventilated, as is so often done, is to add considerably to the risk of infection and to endanger the health of the attendants. Far too little attention is paid to this latter point, although by involving as it does the efficiency of the nursing it intimately affects the interests of the patient. During an attendance upon a fever case a nurse must remember that it is her duty, not to herself only but to her patient, to maintain as high a standard of personal health as possible. This is to be accomplished by thorough ventilation of the room, by taking daily exercise out of doors, by never neglecting meals, and by securing a needful amount of rest.

The Employment of Heat and other Modes of Disinfection.—Nothing can be more certain than that disinfection, as ordinarily practised, is worse than useless, giving a sense of security where no security exists. Heat, for example, is an admirable disinfectant, but only when it exceeds 230° Fahr. Below that, it has no destructive influence on disease-germs. A solution of potassium permanganate is of very limited value, and when used of the ordinary strength is of no value at all. Carbolic acid, in order to be efficient must be used in a solution of the strength of one part of the crystals to nineteen of water, and

recent researches have thrown some doubt upon the efficacy of this agent even when used in this concentrated form.

Chlorine and the fumes of burning sulphur are amongst our most trustworthy destroyers of infection, but it should be remembered that neither of these gases affects the vitality of disease-germs except when employed of such a strength that no human being can live or breathe in the room. Hence they are only available for disinfecting unoccupied rooms and their contents, or, as in the case of chlorine, for disinfecting excreta in an outbuilding. Used, as they sometimes are, in the sick-room, while still occupied by the patient, they are necessarily too dilute to be of any real value.

Notwithstanding this, however, there are certain rules to be observed in all infectious cases.

First, and most important of all, comes the need of efficient ventilation, the manner of insuring which has already been sufficiently dwelt upon.

Secondly, a supply of corrosive sublimate (perchloride of mercury) for preparing disinfectant solution, should be obtained either in the form of ten-grain powders or concentrated solution (1 in 50). One of the powders or one fluid ounce of the concentrated solution, added to a pint of water, makes a solution of the most generally useful strength, viz., one in a thousand. Every powder and bottle containing corrosive sublimate should be labelled "Poison."*

* Corrosive sublimate is the only disinfectant mentioned in the text, because it introduces an element of confusion to recommend one antiseptic for one purpose and another for

A solution of corrosive sublimate (1 in 1000) will be required for the following, amongst other purposes:—

(*a*) For soaking all soiled bed-clothing and personal linen, for at least an hour before being carried from the room. They should, afterwards, be well boiled in the washing, and then freely exposed out of doors.

(*b*) For charging the bed-pan and chamber utensil, and disinfecting the excreta. A little of the solution should be kept at the bottom of the vessel, and more added after it has been used.

(*c*) For disinfecting the nurse's own hands, especially *before taking her meals* and before going out of the room. She should first wash her hands thoroughly in soap and hot water, and then, after rinsing off the soap, immerse them for a minute in the disinfectant solution.

(*d*) For washing the surface of the patient's body during convalescence.

another, and because corrosive sublimate is by far the most efficient chemical disinfectant with which we are yet acquainted.

Many medical men, however, still prefer carbolic acid. For the convenience, therefore, of nurses who are directed to employ the older disinfectant, it may be well to state that a solution of carbolic acid should always be made with *hot* water (to prevent oily drops of the strong acid from floating about in the solution, to the injury of the skin of both patient and nurse). It is also useful to remember that a solution of one fluid ounce of the strong acid to nineteen fluid ounces of water (*i.e.*, 1 in 20) corresponds to the solution of corrosive sublimate, 1 in 1000, while a solution of carbolic acid of half that strength—viz., one fluid ounce to thirty-nine fluid ounces of water, or 1 in 40—corresponds to the solution of corrosive sublimate, 1 in 2000.

(*e*) For washing the surface of stuff and woollen materials.

(*f*) For washing floors and walls.

Thirdly.—Pieces of rag should be used instead of pocket-handkerchiefs, so that they may be burnt at once.

Fourthly.—All poultices, poultice-cloths, soiled dressings, &c., should, immediately on removal, be put in the fire.

Fifthly.—A special supply of basins, cups, plates and glasses should be kept in the room, special care being exercised in their washing.

It is usual to direct that a sheet, wetted with an antiseptic solution, be hung as a curtain, outside, preferably at a little distance from, the door of the room. It is also often directed that, when the skin is peeling after scarlet fever, camphorated oil or some other greasy application should be smeared over the skin to prevent the scales from being wafted in the air and becoming carriers of infection. The utility of both these rules is doubted by many, and the nurse will, on these points, obey the instructions of the medical attendant in charge of the patient.

When a patient has left the sick-chamber, the room must be purified. All the bedding, bed-clothes, and bedroom drapery, together with such of the clothing of both nurse and patient as cannot be otherwise disinfected, must be exposed for some hours either to a temperature of at least 230° Fahr. or to the action of superheated steam. In many districts a stove has been specially provided for purposes of disinfection by the health authorities, who will themselves remove these articles, stove, and return them.

Other articles in the room should, whenever possible, be burnt. Such as are too valuable to be dealt with in this way should be left in the room while it is being fumigated, and afterwards exposed freely to the air out of doors. The room itself is best disinfected by being fumigated with burning sulphur. For this purpose, the doors, chimney, and windows having been carefully closed, sulphur (in the proportion of a pound and a half to every thousand cubic feet of space) is to be laid on an old iron pan or earthenware dish, and set on fire by putting some live coals upon it. The dish must be placed in the middle of the room, supported on a pair of tongs over a bucket of water, to avoid all risk of the woodwork taking fire. The person who sets the sulphur burning must instantly leave the room on account of the danger of suffocation.

After having been kept closed for several hours (for twenty-four hours, if possible), the window may be opened from the outside by means of a string previously attached for this purpose to the upper sash, and the room being then cautiously entered, the windows, chimney and door must be opened widely so as to admit abundance of fresh air, and the loose articles that have been hung up during the fumigation must be exposed out of doors. For further security, the walls and floors should be washed over with the corrosive sublimate solution.

After an attendance upon an infectious case, it is a nurse's duty to see that all her own clothing is thoroughly disinfected; such of it as will bear washing must be well boiled in the washing, while the rest must either be stoved or hung up in a closed room

while sulphur is burnt in the manner above described, and afterwards exposed freely to the air out of doors. She must also take means to disinfect her skin. This may be done by well sponging from head to foot with the solution of corrosive sublimate, one part in a thousand, after washing thoroughly with soap and water. Special care should be taken to cleanse the nails, by dipping a good nail-brush in the antiseptic lotion, and brushing well in between and all around the nails.

If these directions are faithfully carried out, and the nurse spends most of her time out of doors, she need not be kept from her work more than a week.

Special Points in the Nursing of some of the Infectious Fevers: *Measles and Whooping-cough.*—In both these diseases, although in many respects they are so dissimilar, a chief danger consists in the liability to bronchitis and pneumonia (inflammation of the lungs). Hence it is a matter of the utmost importance that children suffering from measles should be kept *in bed from the first*, and until all feverishness has disappeared. The occurrence of any wheezing, or difficulty or unusual rapidity of breathing, should be the signal for immediately acquainting the medical attendant. Bed is equally important during the acute stage of whooping-cough; the common practice, of allowing children, no matter what the stage, to run about as usual out-of-doors, is in great measure responsible for the enormous mortality from this complaint. At a later period, change of air, especially to the seaside, often works wonders, but it is seldom desirable during the first month.

Although it is so essential for children suffering from these disorders to be kept in bed, it is by no means necessary to cover them with many bed-clothes and keep them in a constant perspiration. It is not excessive warmth that is required, but freedom from such exposure to draughts and sudden chills as may be even incurred in passing from a warm room to a cooler one, and this can be secured without any additional bed-clothing.

Great prudence and care are necessary immediately after an attack of measles, especially in the case of weakly and delicate children. It is a disorder that seriously lowers the general health, and is liable to be followed by eruptions, discharges from the eyes, nose, and ears, and other symptoms of debility, for which medical advice should be promptly obtained.

Typhoid and Cholera.—The poison of both typhoid and cholera is given off in the discharges from the bowels, and the stools of patients suffering from these diseases are not only highly infectious when passed, but remain so for a long time afterwards. It is therefore absolutely necessary to disinfect the evacuations immediately by receiving them into a vessel containing some of the corrosive sublimate solution, and adding more of the solution after the vessel has been used. The vessel, after being emptied, should be well rinsed with the disinfectant solution.

On account of the extreme infectiousness attaching to the smallest stain of fæces, the use of paper as a cleansing material should be entirely forbidden both in typhoid and cholera, the nurse, instead, carefully washing the parts with warm water after every

evacuation. Should the sheets happen to become soiled, they must be immediately removed, and plunged into the antiseptic solution.

Further, the nurse must invariably wash her own hands in the disinfectant solution, after assisting a patient with the bed-pan, and again before taking her meals. These precautions doubtless become irksome, but it is at the nurse's peril that she neglects them. In fact, it is from neglecting them that nurses so frequently catch the infection.

The special dangers of typhoid to the patient himself have been incidentally mentioned in the preceding pages. The characteristic of this disease is ulceration of the bowels, whence arises the diarrhœa, and whence, too, arises the liability to hæmorrhage from the bowels. to general inflammation of the bowels (peritonitis), and, most fatal complication of all, to perforation of the bowel. There is, therefore, the most absolute need for avoiding everything that might irritate the bowels, and cause an extension of the already existing mischief. Purgative medicines are not to be thought of, and the greatest care has to be exercised with regard to the diet. The most suitable articles of food are milk, with or without the cautious addition of arrowroot in small quantities, beef-tea, chicken-broth, and eggs; but even milk is liable to cause irritation, if taken in large quantities, owing to the masses of curd which are apt to form during its digestion. For this and other reasons water must be given, and not milk, to relieve the patient's thirst, milk being only administered at stated times and in the quantity prescribed by the medical attendant. Not the slightest departure from this simple dietary must be allowed, except with

medical permission, and, however great the craving for it, solid food must be rigidly withheld, until convalescence has been thoroughly established, and the temperature has remained normal for a fortnight.

All exertion on the part of the patient is to be carefully prevented, and on no account should he be allowed to rise from bed without permission from the medical attendant.

The necessary cleansing of patients, after the bed-pan has been used, should be accomplished by turning them gently on to the side and not by raising them up.

In cases of typhoid the early hours of the morning are attended with special risk of dangerous prostration, hence care must be taken to keep up the body warmth, and to administer small quantities of nourishment frequently.

In severe cases, the debility and emaciation are apt to be extreme in the later stages of the disease, and means should be adopted to avoid all fatigue, and to prevent the formation of bed-sores.

Cholera.—During an epidemic of cholera, any one feeling the slightest tendency to diarrhœa should at once lie down, and adopt means, both medicinal and dietetic, for checking the action of the bowels. The horizontal posture must be scrupulously maintained until the attack has entirely passed off.

The cramps of cholera are best relieved by gentle rubbing. When thirst becomes a very marked symptom, there is no reason for withholding the cold water for which the patient craves. Should the face become blue and shrunken, the voice hollow, and the surface of the body cold, every effort must be made to restore

and maintain the body-warmth, by means of rubbing and of the application of hot bottles to various parts of the body. A hot bath (98° to 105° Fahr.) is of great service under these circumstances.

During convalescence from cholera, the utmost care is required. For some days the food should be extremely simple, and all exertion should be avoided.

Typhus.—In typhus fever, the great point in the nursing is to be indefatigable in the administration of suitable nourishment, and, when they are ordered, of stimulants; the object being to sustain the vital powers until the fever abates. During the delirium, patients should be incessantly watched; the moment they are left they are apt to rise out of bed and so endanger their lives. The condition of the bladder needs particular attention, lest retention of urine be overlooked.

Diphtheria.—Every case of diphtheria, however mild, should be regarded seriously from the very outset. The neglect of precautions, in cases thought to be merely examples of ordinary sore throat, is one of the main causes of the spread of this disease. Unfortunately, persons infected from a mild case may themselves have the disease in its most severe and fatal form. Hence, no pains should be spared to check the spread of infection.

One chief source of danger in diphtheria is the prostration, which is one of its most common characteristics. Patients, therefore, need to have their strength sustained by the regular and persistent administration of nourishment. They also require a constant and abundant supply of fresh air, which they are often denied from the fear of aggravating the con-

dition of the throat. The room in which they are nursed should be as capacious as possible, and no prejudices about the risks of catching cold should prevent the windows from being kept constantly and widely open. A fire, always desirable in the infectious fevers, becomes an absolute necessity in diphtheria, on account of the special need for free ventilation. Not only is this lavish supply of fresh air necessary for the patient's safety, but also for keeping up the nurse's health. Nurses, both when attending diphtheria and scarlet fever, are particularly liable to sore throat with slight glandular enlargement, nausea, and languor. Efficient ventilation obviates this tendency, it being essential at the same time that the nurse should be specially careful to take plenty of food, and never to neglect the daily walk out-of-doors.

As is now well known, the part in which diphtheria manifests itself locally is the throat, which becomes covered with a white membrane; sometimes the mischief reaches down to the windpipe, when symptoms of suffocation are apt to arise which may necessitate the operation of opening the windpipe (tracheotomy). The medical attendant will, in all cases, give directions as to the mode of making the necessary local applications to the throat, *e.g.*, steam spray, lotions, iodoform insufflation, &c.

The making of these applications both in diphtheria and in scarlet fever is attended with such enormous risk to the nurse herself, owing to the extremely infectious character of the throat secretions, that she ought either to adopt the German method of holding a piece of glass before her face while making them, or to wear some form of respirator-inhaler over the

mouth and nose. Nothing can be simpler fort his purpose than the little apparatus devised by Dr. I. Burney Yeo for antiseptic inhalation. While, however, carrying out these necessary precautions, nurses must be careful not to give patients the impression that they are afraid of them, such an impression having very often a dispiriting effect which may be highly dangerous.

Scarlet Fever.—The sources of danger in scarlet fever vary at different periods of the attack. During the first two or three days, death may occur from convulsions or from the sheer intensity of the poison; during the second week, the ulceration of the throat, almost always present to a greater or less degree, is apt to assume an unhealthy character and lead to deep sloughing, or to extensive glandular swelling in the neck with return of fever and sometimes with rheumatism. The third week has also its special danger, namely, inflammation of the kidneys, accompanied with albumen in the urine, and often with more or less dropsy. Hence the importance of keeping even the mildest cases of scarlet fever either in bed, or, at any rate, free from the least exposure to cold until this danger has passed; hence also the need of strictly watching the urine, however well the patient may seem, from the end of the second to the end of the third week. Should it become at all scanty in amount or smoky in appearance, should the desire to pass it become more frequent, or should there be headache with vomiting, mischief should be suspected and the medical attendant at once informed.

The period during which the skin is peeling (the stage of desquamation) is highly infectious; it com-

mences as the rash disappears and lasts a very variable time, the fingers and feet, especially the soles, being the last to become clear; until it is entirely over, the patient should on no account be allowed to mix with others. There is some difference of opinion as to the expediency of rubbing the body with oil, but as to the value of frequent sponging there can be no doubt.

When the peeling is over, and the throat perfectly well, two or three thorough spongings with warm solution of corrosive sublimate (1 part in 1000) should be given on successive nights, followed by the use of soap and water to the whole body. After the last sponging the patient should be removed into another room and not allowed to return, or to wear any of the clothes used during the attack. He should not be allowed to mix with his fellows for at least *six weeks* from the commencement of the illness, and not even then if there is any peeling, sore throat, or ear discharge.

Smallpox.—Smallpox being amongst the most highly contagious of the eruptive fevers, no nurse should be allowed to take charge of a case who is not protected either by having had the complaint, or by having been thoroughly and recently re-vaccinated. Moreover, all who have been *in the neighbourhood of the infected* should immediately be re-vaccinated.

Severe cases, and especially those occurring in the unvaccinated, make great demands upon a nurse, partly on account of the delirium which is an almost constant accompaniment, necessitating the most unremitting vigilance, and partly on account of the rash itself being a source of so much irritation and discomfort, and needing so much local attention. The

disease commences with symptoms of great severity; even during the first few hours the temperature is often very high, the pulse rapid, and the headache intense. Vomiting frequently occurs, and pain in the loins is so constant as to be considered one of the most characteristic symptoms. Violent delirium may also set in early. The rash makes its appearance on the third day in the shape of small shotty spots slightly raised above the level of the skin, and showing, subsequently, a little pit in the centre. Successive crops of these spots continue to appear for several days. A day or two after first appearing, they are seen to contain a little clear watery fluid, which, as the spots (or vesicles) enlarge, gradually loses its transparency and becomes thick and muddy. Those on the face begin to burst about the seventh day, and those on the body and limbs a little later. For about three days there is high fever, which then abates for a time to reappear towards the eighth day. On the eleventh day the symptoms are usually at their height, and from that time gradually decline. In vaccinated persons the disease is modified in character and passes through its several stages more quickly than in the unmodified form above described.

The pain accompanying the eruption is best relieved by hot fomentations and warm baths. On the fifth or sixth day, when the vesicles begin to be prominent, they should be pricked with a needle and bathed with warm water containing some disinfectant, such as boracic acid or liquor carbonis detergens. In the later stages hot fomentations are exceedingly useful in relieving pain, loosening crusts, destroying the offensive odour, and lessening the risk of pitting.

Many other applications have been suggested with a view to prevent pitting, such as nitrate of silver, flexile collodion, iodine, and, more recently, carbolic acid and glycerine, mixed in the proportion of three parts of the former to one of the latter, which is to be applied by means of a camel's-hair brush to each individual vesicle while still unopened. Remedies of this class must not be used when there is much swelling of the face, and, to be effectual, should be applied before the fluid in the vesicles become thick.

On account of the thickness and hardness of the skin on the palms of the hands and soles of the feet, these parts require to be specially looked after, more particularly in the case of working-people, and the vesicles must be opened early, or much pain and irritative fever may ensue. The genital organs should also be carefully watched. A little castor oil may with advantage be dropped into the eyes at night, to prevent the lids sticking together. After the crusts have separated, the face should be dusted with equal parts of powdered starch and oxide of zinc, or, better still, powdered boracic acid. For the delirium, ice-bags should be applied to the head. The wet pack used twice a day has proved highly beneficial.

Children should be provided with gloves, lined with cotton-wool, to prevent scratching.

Inflammation of the windpipe is particularly apt to come on about the eleventh day; it should be immediately reported to the medical attendant, as it may be necessary for him to perform the operation of opening the windpipe.

Smallpox patients should not be allowed to mix with healthy persons until every trace of scab has disappeared.

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